NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

CIVIL PENALTY EFFECTIVENESS

IN THE

UNITED STATES COAST GUARD

by

Robin Alan Wendt

December, 1981

Thesis Advisor: Dan C. Boger

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The data analysis indicates support for the basic model as well as the hypothesis that increasing the enforcement activity raises the cost of non-compliance more than increasing the level of assessed penalties.

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Civil Penalty Effectiveness

in the

United States Coast Guard

by

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

The civil penalty is the prime sanction in the United States Coast Guard's law enforcement programs. There have been numerous efforts to describe the impact of civil penalties on entities involved in the legal compliance process. These efforts have resulted in the development of economic models, few of which have been tested with actual data, and none of which have been tested in a Coast Guard environment.

This thesis analyzes Coast Guard civil penalty data to validate a basic economic model. An entity perceives an expected cost of non-compliance based on the probability of detection and the penalty assessed if detected. This is compared to the cost of compliance and the entity, as a *rational actor, choses the least expensive alternative.*

The data analysis indicates support for the basic model as well as the hypothesis that increasing the enforcement activity raises the cost of non-compliance more than increasing the level of assessed penalties.

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I. INTRODUCTION

The use and effectiveness of civil penalties in law enforcement programs is widely recognized and encouraged wherever the primary intent of the program is deterrence [Ref. 1]. The United States (U.S.) Coast Guard (hereinafter Coast Guard) has many deterrence-oriented law enforcement programs founded on statutes that provide civil penalty sanctions. In these law enforcement programs, civil penalties are assessed for violations of U.S. statutes and/or regulations that the Coast Guard enforces and for which a proper civil penalty case has been submitted.

Violation cases are initiated by Coast Guard field units that have some responsibility for specific law enforcement programs. The violation cases are then submitted by the field units to their respective program managers on the staff of the District Commander. There are 13 Coast Guard Districts each encompassing a specific geographic area of the United States. It is the Commander of each Coast Guard District who has the responsibility to process the violation case through his or her program manager and ensure a penalty is assessed where warranted. The penalty assessment authority is delegated to a member of the District Commander's staff entitled the "Hearing Officer" [Ref. 2]. A chart is presented in Appendix A which delineates the violation case flow up to the Hearing Officer using the organization of the Coast Guard District Office in the study area.

The author's research indicated that there exist no unilateral guidelines generated within the Coast Guard concerned with Hearing Officer

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qualifications or how the Hearing Officer should weigh all factors in determining an appropriate penalty. The sole unilateral guidance to Hearing Officers comes from the Federal Regulations that create the authority for penalty assessment. However, the guidance is of a very general nature. Typical wording from the regulations that gives some guidance is that the Hearing Officer shall make "fair and impartial decisions" and shall assess an "appropriate penalty" [Ref. 3]. Nowhere is there a discussion of the numerous economic models developed to describe the law compliance process and the impact of civil penalties on the goals of the various law enforcement programs.

As will be developed herein, the primary goal of any civil penalty law enforcement program is deterrence. Deterrence is primarily a function of the amount of the penalty for not complying with a statute or regulation and the probability that the violation will be detected [Ref. 4]. The probability of detection relates in large part to the enforcing agency's activity. Activity as used herein means the physical efforts by the agency to enforce statutes or regulations, such as patrols or inspections. It is important to realize that there are two ways then to deter would-be violators. An agency can either increase enforcement activity, and thus the probability of detection, or it can increase the penalty for those violations detected. The option to increase enforcement activity carries resource costs to the enforcing agency. The option to increase the level of penalties assessed against violators carries no additional cost to the enforcing agency, but certainly increases the costs to the violator. The Coast Guard, like any agency, may be able to obtain a constant compliance level from those it regulates even in view of budget cuts and resultant decreases in enforcement activity.

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Hearing Officers need to know that civil penalties should be assessed at, or at least towards, some optimum level so that the greatest deterrence is obtained for the number of law enforcement resources employed. They need to be made aware of how entities view the law compliance decision. Before any guidance is given, however, a test to validate the economic models describing the law compliance process is needed. The author contends that this test would be much more valuable to the Coast Guard if it were conducted using Coast Guard data collected from a Coast Guard environment.

It is the intent of this thesis to examine Coast Guard data and test the numerous economic models that describe the law compliance decision process. The thesis will first discuss the relevant law enforcement programs of the Coast Guard and the specific statutes and regulations contained in those programs relevant to this effort. Secondly, a presentation will be made of previous efforts in developing economic models to describe the decision process of compliance. Thirdly, a description of the Coast Guard data obtained and the statistical techniques used in the data analysis will be presented. Finally, conclusions will be stated about the results of the data analysis in light of the assumptions made.

A final point should be addressed before proceeding with the investigation. There rarely exist circumstances in real life that are controlled enough to allow for a definitive test of any economic model of the compliance decision process. The single thing most often lacking is a varying level of assessed penalty for the same violation and the opportunity to examine the difference in impact from the different levels [Ref. 5]. The author feels it would be unethical and impractical to conduct

real life experiments on alleged violators when real costs are being incurred. In the Coast Guard and specifically the Eleventh Coast Guard District, both a change in Hearing Officers and a moderate change in the rules governing the civil penalty assessment process occurred simultaneously [Ref. 6]. A result of this, though perhaps not a causative result, was that different civil penalty assessment policies existed in adjacent time periods. This provides a unique opportunity to test the hypotheses presented by many economic models about how entities view the compliance process and how they react to different levels of penalty assessment.

The Coast Guard District selected for this analysis was the Eleventh Coast Guard District. This District is headquartered in Long Beach, California, and extends along the Pacific Coast from the Mexican border to the Santa Maria River, and extends inland to include the Colorado River. Appendix B graphically portrays the Eleventh Coast Guard District. The time frame of the analysis, which was somewhat restricted by the availability of data, begins in January, 1978 and continues to September, 1981. As will be discussed, there are more precise dates depending on which law enforcement program is being analyzed. The analysis will show how the penalties assessed varied between regimes of Hearing Officers. The first effort of the data analysis will be to show just how much different the assessed penalties were under each Hearing Officer and to examine the number of violations detected under each Hearing Officer. Efforts which follow will be towards accounting for differences in enforcement activity existant under each Hearing Officer. This considers then both the amount of the assessed penalty and the probability that the violation would have been detected.

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II.   FRAMEWORK FOR PENALTY ASSESSMENT

A. INTRODUCTION

This chapter will first describe the relevant Coast Guard missions

and related law enforcement programs. For reasons that will be address-

ed, only two of these programs will be considered in the analysis. Next,

the specific statutes and regulations, for which violations were con-

sidered in this analysis, will be presented. Finally, the regulations

from which the Coast Guard derives its authority to assess penalties, and

also gives some limited guidance to the Hearing Officer, will be

discussed.

B. MISSIONS

The Coast Guard has numerous missions. Of these, four are strictly

law enforcement missions and are primarily deterrence-oriented. While

there are other missions in the Coast Guard that do involve some law

enforcement activity, they are not primarily oriented towards that end.

The title and objective of these four missions is listed below as

extracted from "The U.S. Coast Guard: Its Missions and Objectives"

(1978): [Ref. 7]

> Marine Environmental Protection (MEP) - The primary objective is to
> maintain or improve the quality of the marine environment through
> preventive measures. The secondary objective is to minimize the
> damage caused by pollutants discharged into the marine environment by
> providing coordinated and effective response to remove discharges of
> oil or hazardous substances. Congress has established, through en-
> acted statutes, the restorations and maintenance of the chemical,
> physical, and biological integrity of the nation's waters as a
> national objective. The Coast Guard is the primary maritime agency
> empowered to meet this national objective. The role for the Coast

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Guard in marine environmental protection is a logical extension of its traditional missions in marine law enforcement.

Port Safety and Security (PSS) - The objective is to safeguard the nation's navigable waters and adjacent shore areas, including ports and their related facilities, from accidental or intentional harm. By assuring the safety of the ports and waterways and of persons and property nearby, the utilization of these vital marine transportation links is facilitated. Early legislation had limited this program to those periods of time during which the President declared a state of national emergency or made a finding that the security of the U.S. was endangered. More recent legislation enlarged the scope of the program and gave it permanence by authorizing it in all times.

Recreational Boating Safety (RBS) - The objective is to reduce the risk of loss of life, personal injury, and property damage associated with the use of recreational boats in order to provide boaters with maximum safe use of the nation's waterways. This program incorporates a variety of activities directed towards the stated objective and integrates Coast Guard efforts with those of the Coast Guard Auxiliary, Power Squadron, Red Cross, and State and local governments. The Coast Guard provides financial assistance to the States to administer their approved boating safety programs.

Commercial Vessel Safety (CVS) - The objective is to minimize deaths, personal injuries, and property loss or damage in the marine environment associated with the design, construction, and manning of merchant vessels and with their cargoes. The roots of this program go back to the first half of the nineteenth century when the first CVS legislation was enacted. This program had been administered in part by other organizations but in 1946, the administration of the program was permanently transferred in its entirety to the Coast Guard. After 1946, additional legislative authority had broadened the scope of the program. The Coast Guard exercises jurisdiction primarily over U.S. vessels but also conducts a program for foreign vessels which is based on international treaties.

Each law enforcement program described is founded on statutes enacted by Congress. A statute is legislated law designed to prohibit something or declare something to be illegal [Ref. 8]. Often a statute cannot specify in great detail what is to be prohibited or declared illegal. As a result, the statute will assign to the Executive Department the responsibility to create regulations under the authority of the law. Strictly speaking, "regulate" and "legislate" (as in a statute) are not synonymous.

To regulate means to supervise or exercise authority [Ref. 9]. Nonetheless, regulations carry the same weight as law and have the same penalty provisions. For all intents and purposes, the person who must decide whether or not to comply with all legal requirements cannot differentiate between a statute or a regulation. Similarly, the enforcing agency makes no differentiation in its treatment of statutes and regulations.

The large majority of the statutes and regulations which are the cornerstone of the Coast Guard law enforcement programs carry a civil penalty provision. Some also carry criminal provisions. There is considerable difference between the two types of provisions. A criminal provision requires a trial by jury or other formal proceedings for a person to be found guilty. In addition, a criminal provision may allow for restriction of freedom and/or a criminal fine. A civil penalty provision on the other hand only provides for one thing, namely the assessment of a penalty. A civil penalty is simply a liability created such that the person against whom the penalty is assessed is liable to the U.S. Government for the amount of the penalty. A civil penalty can be assessed in informal administrative proceedings and takes a great burden off the court system. There are no requirements for proof beyond a reasonable doubt but rather a determination of sufficient evidence is required [Ref. 10]. A more detailed discussion of civil penalties will be deferred until later in this thesis.

This analysis will be limited to the MEP and RBS law enforcement programs. The data available in the CVS and PSS programs was insufficient for a detailed analysis. The lack of sufficient data related to the structure of the violations processed in the four programs. The MEP

and RBS law enforcement programs process very structured, simple, and repetitive type violations in great volume. The CVS and PSS law enforcement programs process much more complex and unstructured violations and do so in far fewer numbers, thus providing insufficient data.

C. THE STATUTES AND REGULATIONS

The statutes and regulations of the MEP and RBS law enforcement programs used in this analysis will now be discussed in detail. The rules which create the process by which the Coast Guard assesses civil penalties will also be discussed.

1. MEP Statutes and Regulations

The MEP law enforcement program is, in fact, based largely on a single statute. There are regulations promulgated under that and other statutes but sufficient data in the study area existed only for analysis of the statute itself. The statute as enacted was known as the Federal Water Pollution Control Act, as amended, 1972. The statute was further amended in 1978 and is now entitled the Clean Water Act [Ref. 11]. The statute was codified in the United States Code (USC) in Title 33-Navigation and Navigable Waters. That portion of the statute applicable to the Coast Guard is contained in section 1321. (Note: this statute is also enforced by the Environmental Protection Agency (EPA). A line which defines coastal and inland waters has been developed. The EPA is responsible for incidents in inland waters. The Coast Guard is the primary enforcement agency for coastal waters but often participates in inland water incidents also.)

The Clean Water Act begins with a statement of policy:

33 USC 1321(b)(1) - "The Congress hereby declares that it is the policy of the United States that there should be no discharges of oil or hazardous substances into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act (43 USC 1331 et. seq.) or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States."

In addition to assigning responsibility to both the Coast Guard and the Environmental Protection Agency for the development of regulations designed to prevent discharges of oil or hazardous substances, the Clean Water Act makes a statement about the illegality of polluting the waters affected by the statute:

33 USC 1321(b)(3) - "The discharge of oil or hazardous substances into or upon the navigable waters of the Unites States, adjoining shorelines, or into or upon the waters of the contiguous zone, ... in such quantities as may be harmful as determined by the President ...is prohibited."

In this analysis, no cases of prohibited discharges of hazardous substances were encountered. All cases analyzed dealt solely with prohibited discharges of oil. It is also important here to point out that the term "harmful quantity" has in fact been defined in the Code of Federal Regulations (CFR). Harmful quantity is defined in Title 40 of the Code of Federal Regulations-Protection of the Environment: [Ref. 12]

40 CFR 110.3 - "For purposes of .... the Act, discharges of such quantities of oil into or upon the navigable waters of the United States or adjoining shorelines determined to be harmful to the public health or welfare of the United States, at all times and locations and under all circumstances and conditions, except as provided in... part, include discharges which:
(a) Violate applicable water quality standards, or
(b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines."

In the cases analyzed, the second standard for harmful quantity was used exclusively to establish a harmful quantity. It is not difficult to understand why. An investigating officer need only state that he or she observed a sheen or discoloration upon the water. Proving violation of a certain water standard is much more difficult. These standards are often stated as parts of pollutant per million parts of water and require the water/pollutant mix to be analyzed in a laboratory.

The Clean Water Act describes other illegal acts such as reporting requirements that require a discharger who has knowledge of his or her illegal act to report it to the appropriate government office. The Act further describes other actions which are illegal and are also criminal. The simple act of discharging oil in violation of 33 USC 1321 (b)(3) without willful intent is a civil violation and carries a civil penalty provision. This provision is defined in the statute:

> 33 USC 1321(b)(6)(A) - "Any owner, operator, or person in charge of any onshore facility or offshore facility from which oil or a hazardous substance is discharged in violation of paragraph (3) of this subsection shall be assessed a civil penalty by the Secretary of the department in which the Coast Guard is operating of not more than $5,000 for each offense. Any operator, owner, or person in charge of any vessel from which oil or a hazardous substance is discharged in violation of paragraph (3) of this subsection, ... shall be assessed a civil penalty by the Secretary of the department in which the Coast Guard is operating of not more than $5,000 for each offense. No penalty shall be assessed unless the owner or operator charged shall have been given notice and opportunity for a hearing on such charge. Any such penalty may be compromised by such Secretary. In determining the amount of the penalty, or the amount agreed upon in compromise, the appropriateness of such penalty to the size of the business of the owner or operator charged, the effect on the owner or operator's ability to continue business, and the gravity of the violation shall be considered."

There are important aspects of this civil penalty provision that should be discussed. First, the authority to assess penalties has been

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delegated to the Coast Guard District Commanders. This delegation is contained in 33 CFR 1 [Ref. 13]. Further delegation to the Hearing Officer will be discussed later in this chapter. Second, the terms onshore and offshore facility have taken on the broadest form, as has already the term vessel. The statute seems to narrow the type of sources from which a prohibited discharge can emanate by use of the terms facility and vessel. Nonetheless, their definition is now so broad that the investigating officer need not be concerned with the aspect. If all other aspects of a violation are present, it matters not what the source was. If it is identifiable, a case may be made against it.

Finally, it is rare that a statute mandates a penalty where a violation has occurred, but the Clean Water Act has done so in the wording "... shall be assessed ..." Certainly there are many considerations in determining an appropriate penalty and the statute specifies some, e.g., gravity of the violation and financial impact of the penalty. Nonetheless, even in the most faultless incidents, even where the discharger is financially destitute, a penalty, however small, must be assessed.

2. RBS Statutes and Regulations

The various legal requirements under this program were greatly unified with the passing of the Federal Boating Safety Act of 1971, the main statute of the RBS law enforcement program [Ref. 14]. Unlike the MEP law enforcement program, the large majority of legal requirements are contained in regulations rather than in the statute itself. The statute itself will first be examined and then the specific and detailed regulations themselves will be presented.

The Federal Boating Safety Act of 1971 was codified into the United States Code (USC) in title 46-Shipping in sections 1451-1489. The Act starts out with a policy statement:

> 46 USC 1451 - "It is hereby declared to be the policy of Congress and the purpose of this chapter to improve boating safety and to foster greater development, use, and enjoyment of all the waters of the United States by encouraging and assisting participation by the several States, the boating industry, and the boating public in development of more comprehensive boating safety programs; by authorizing the establishment of national construction and performance standards for boats and associated equipment; and by creating more flexible regulatory authority concerning the use of boats and equipment. It is further declared to be the policy of Congress to encourage greater and continuing uniformity of boating laws and regulations as among the several States and the Federal Government, a higher degree of reciprocity and comity among the several jurisdictions, and closer cooperation and assistance between the Federal Government and the several States in developing, administering, and enforcing Federal and State laws and regulations pertaining to boating safety."

It is interesting to note how the Congress had actually encouraged enforcement of the Federal standards by the States. This did not materialize to the extent desired and the Coast Guard remains the primary boating safety law enforcement agency.

The Act further describes the applicability of the various requirements:

> 46 USC 1453(a) - "This chapter applies to vessels and associated equipment used, to be used, or carried in vessels used, on water subject to the jurisdiction of the United States and on the high seas beyond the territorial seas for vessels owned in the United States."

As with the Clean Water Act, responsibility is assigned for the creation of regulations that implement portions of the statute. Much of this act has to do with the manufacture for sale of boats and related equipment. This thesis will be interested only in the operational requirements for boat owners and operators, and not for construction requirements for boat manufacturers.

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With respect to the responsibility of the Secretary of the Department in which the Coast Guard is operating:

> 46 USC 1454(a)(2) - "The Secretary may issue regulations requiring the installation, carrying, or using of associated equipment on boats and classes of boats subject to this chapter; and using of associated equipment which does not conform with safety standards established under this section."

Certainly there have been regulations issued under the authority of this provision as well as previously established regulations adopted under the authority of the Act. Before those regulations are examined, it is appropriate that two more sections of the Act be presented. The first deals with one boating requirement that is stated in the statute itself. It deals with the negligent operation of a boat:

> 46 USC 1461(d) - "No person may use a vessel, including one otherwise exempted...., in a negligent manner so as to endanger the life, limb, or property of any person. Violations of this subsection involving use which is grossly negligent, subject the violator, in addition to any other penalties prescribed in this chapter, to the criminal penalties prescribed in section 1483 of this title."

The second part of the Act that should be reviewed is section 1484 which provides for civil penalties and considerations in assessing an appropriate penalty:

> 46 USC 1484(b) - "In addition to any other penalty prescribed by law, any person who violates a provision of this chapter or the regulations issued thereunder, shall be liable to a civil penalty of not more than $500 for each violation. If the violation involved the use (emphasis added) of a vessel, the vessel, ... shall be liable and may be proceeded against in the district courts...."

> 46 USC 1848(c) - "The Secretary may assess and collect any civil penalty incurred under this chapter and, in his discretion, remit, mitigate, or compromise any penalty prior to referral to the Attorney General. In determining the amount of any penalty to be assessed hereunder, or the amount agreed upon in any compromise, consideration shall be given to the appropriateness of such penalty in light of the size of the business of the person charged, the gravity of the violations, and the extent to which the person charged has complied with the provisions of section 1464 of this title or has otherwise attempted to remedy the consequences of the said violation."

The authority to assess penalties has been delegated to the Coast Guard District Commanders in 33 CFR 1 just as it was delegated for the Clean Water Act. Also, the term "use" should be examined. It is defined as "operate, navigate, or employ" [Ref. 15].

The presentation of the specific regulations will be by groups. There will be three in all. They include numbering/certificate regulations, safety equipment regulations, and navigation equipment regulations. The regulations appear to use the terms vessel and motorboat interchangeably. This need not be of concern though at times, each has a very restricted meaning. The use of different terms reflects different statutes enacted at various times in history when statute writing was not as demanding as it is today.

a. Numbering/Certificate Regulations

Numbering and certification requirements are contained in Title 33, Code of Federal Regulations, Part 173 (33 CFR 173) [Ref 16]. The basic numbering provisions is stated thus:

> 33 CFR 173.15(a) - "Except as exempted, no person may use a vessel to which this part applies unless-
> (1) It has a number issued on a certificate of number by the issuing authority in the State in which the vessel is principally used; and
> (2) The number is displayed as required....."

The basic certification requirement, referred to as Certificate of Number, is stated thus:

> 33 CFR 173.21(a) - "Exempt as expted, no person may use a vessel to which this part applies unless it has on board-
> (1) A valid certificate of number.....; or
> (2) ....a copy of the lease or rental agreement, signed by the owner or his authorized representative and by the person leasing or renting the vessel."

Further, the Certificate of Number is required to be on board and available for inspection:

33 CFR 173.23 - "Each person using a vessel to which this part applies shall present the certificate or lease or rental agreement required by section 173.21 to any Federal, State, or local law enforcement officer for inspection at his request."

33 CFR 173.25 - "No person may use a vessel to which this part applies unless the certificate or lease or rental agreement required by section 173.21 is carried on board in such a manner that it can be handed to a person authorized under section 173.23.

These regulations were developed under the Federal Boating Safety Act and carry the same penalty provisions of the Act itself.

 b. Safety Equipment Regulations

  The safety equipment regulations pertain to both personal safety equipment and boat safety equipment. They are simple straight-forward requirements and will be listed here without comment: [Ref 17]

46 CFR 25.25(b), (c) & (d) - "Each vessel ... must have at least one life preserver, buoyant vest, or special purpose water safety buoynat device intended to be worn, approved under Subchapter Q, of a suitable size for each person on board. Further, each vessel 26 feet in length must have at least one approved ring life buoy."

46 CFR 25.30 - "Each vessel ... shall carry at least the minimum number of hand portable fire extinguishers set forth in Table 25, 30-20(a)(1)."

46 CFR 25.35 - "Every gasoline engine installed in a motorboat or motor vessel ... shall be equipped with an acceptable means of back-fire flame control as specified in part 25.35-1(e)."

46 CFR 25.40-1(a) - "All motorboats or motor vessels, ... shall have at least two ventilator ducts, fitted with cowls or their equivalent, for the efficient removal of explosive or flammable gases from the bilges of every engine and fuel tank compartment. There shall be at least one exhaust duct installed so as to extend from the open atmosphere to the lower portion of the bilge and at least one intake duct installed so as to extend to a point at least midway to the bilge or at least below the level of the carburetor intake. The cowls shall be located and trimmed for maximum effectiveness and in such a manner so as to prevent displaced fumes from being recirculated."

Since these regulations were adopted under the *Federal Boating Safety Act*, the penalty provisions for the regulations are the same as the provision of the Act itself.

c. Navigation Equipment Regulations

The navigation equipment regulations are somewhat unique in that a single regulation adopts an entire set of separate requirements [Ref. 18]:

46 CFR 25.02-1(a) - "Each vessel including motorboats, ... must be equipped with the navigation lights and shapes, whistles, bells, and gongs required by the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS)."

The specific types of equipment need not be spelled out here as the regulation describes the general types of equipment of concern.

3. Civil Penalty Proceedings in the Coast Guard

The rules for the conduct of civil penalty proceedings are written as Federal Regulations and are codified in Title 33 of the Code of Federal Regulations. These rules were modified in 1978 [Ref. 19]. Prior to that time, civil penalties were assessed by division or branch chiefs on the staff of a Coast Guard District Commander. These division or branch chiefs were also and primarily responsible for the execution of their specific law enforcement programs, hence their common title of "program managers." The modification proscribed any involvement by the program managers in the civil penalty assessment process. The stated reasons for the change included the need for a more comprehensible process for the assessment of civil penalties and a more definitive set of time limits within which action must be taken. Though not stated as a reason for this modification, the change did take control of penalty

assessment out of the hands of the program managers. While civil penalty actions take a tremendous burden off the government because court trial requirements are waived in favor of informal administrative proceedings, fairness and the rights of the individual are still of paramount importance [Ref. 20]. It is not hard to imagine that a program manager might subconsciously give greater credance to Coast Guard evidence, than evidence presented by the alleged violator.

Plainly, there were two different sets of rules which existed in the time period of the analysis. In the first part of the analysis, the program managers were responsible for penalty assessment. In the second part, the Hearing Officer, someone with no connection whatsoever with the case, alleged violator or the enforcement resources, was responsible for civil penalty assessment. These rules may or may not have accounted for any difference in penalty assessment policies. This is not important, however. It is assumed that the individual, or other entity, is not concerned with why a penalty assessment policy is as it is, but rather his or her sole interest is simply what the policy is.

The new rules specify how violations of statutes and/or regulations may be reported. (Note: the term District Commander as used herein refers to that Coast Guard Officer who is in charge of a certain geographical area of the U.S. as well as the execution of the law enforcement programs. It is his or her staff that receives investigative reports of violations from Coast Guard field units and prepares them for submission to the Hearing Officer.)

33 CFR 1.07-10(a) - "Any person may report an apparent violation of any law, regulation, or order that is enforced by the Coast Guard to any Coast Guard facility. When a report is received of an apparent

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violation, or when an apparent violation has been detected by any
Coast Guard personnel, the matter is investigated or evaluated by
Coast Guard personnel."

It should be noted, however, that the Coast Guard does process a small
number of violations of the Clean Water Act that are investigated and
written up by the Environmental Protection Agency (EPA). No cases
originated by the EPA were used in the analysis, however. These cases
are few in number and often involve a much different type of entity than
do the cases investigated by the Coast Guard. This is mainly because EPA
cases involve prohibited discharges of oil that occur inland and there is
less opportunity for a violation there. Since there existed so few
cases, it was felt that factors unique to these cases could not accu-
rately be accounted for in the analysis.

The rules create a position entitled "Hearing Officer." A
Hearing Officer is a Coast Guard officer or employee who has been dele-
gated the authority to assess civil penalties. The rules specify certain
restrictions on the Hearing Officer:

33 CFR 1.07-15(b) - "The Hearing Officer decides each case on the
basis of the evidence before him, and must have no prior connection
with the case. The Hearing Officer is solely responsible for the
decision in each case referred to him."

After a Hearing Officer has been in place for six months or so, it is
highly unlikely he or she could have had any connection with the case.

The rules specify certain actions upon receipt of an investi-
gative report of violation:

33 CFR 1.07-20 - (a) "When a case is received for action, the Hearing
Officer makes a preliminary examination of the material submitted.
If, on the basis of the preliminary examination, the Hearing Officer
determines that there is insufficient evidence to proceed, or that
there is any other reason which would make penalty action inappro-
priate, the Hearing Officer returns the case to the Coast Guard

District Commander with a written statement of the reason. (b) If on the basis of the preliminary examination of the case file, the Hearing Officer determines that a violation appears to have been committed, the Hearing Officer notifies the party in writing of:
(1) The alleged violation and the applicable law or regulation;
(2) The amount of the maximum penalty that may be assessed for each violation;
(3) The general nature of the procedure for assessing and collecting the penalty;
(4) The amount of penalty that appears to be appropriate, based on the material then available to the Hearing Officer;
(5) The right to examine all materials in the case file and have a copy of all written documents provided upon request; and
(6) The fact that the party may demand a hearing prior to any actual assessment of a penalty."

The next action in the process is for the alleged violator to act on the notification:

33 CFR 1.07-25 - (a) "Within 30 days after receipt of notice of the initiation of the action, the alleged violator may request a hearing, provide information for the Hearing Officer to consider in final resolution of the case, or pay the amount specified in the notice. (b) The right to a hearing is waived if the alleged violator does not respond within 30 days."

The manner in which an alleged violator presents his or her side of the story, either at a hearing or in correspondence, is largely irrelevant. The rules provide for either method, however.

Once the Hearing Officer has information from the alleged violator or the alleged violator has not responded, the Hearing Officer makes a decision in the case:

33 CFR 1.07-65 - (a) "The Hearing Officer must issue a written decision. Any decision to assess a penalty is based upon substantial evidence in the record. If the Hearing Officer finds that there is not substantial evidence in the record establishing the alleged violation or some other violation of which the party had full and fair notice, the Hearing Officer shall dismiss the case and remand it to the District Commander. (b) If the Hearing Officer assesses a penalty, the Hearing Officer's decision must also inform the violator of his right to appeal and how to effect an appeal."

Should the violator appeal, the Hearing Officer is guided in his actions by further rules:

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33 CFR 107-75 - "Upon receipt of an appeal, the Hearing Officer provides the District Commander an opportunity to submit written comments on the appeal. The appeal is then forwarded within 20 days to the Commandant of the Coast Guard for final determination."

The remainder of the rules specify collection actions for delinquent penalties and procedures for reopening hearings when new evidence is discovered that could affect the outcome of the case.

D. SUMMARY

This chapter laid the foundation for the analysis. The relevant missions of the Coast Guard have been presented and the reasons for selecting the RBS and MEP programs for analysis addressed. The statutes and regulations involved in the analysis were presented as well as regulations that create and structure the civil penalty assessment process in the Coast Guard. All factors which must be considered in determining an appropriate penalty have been identified. It is now appropriate to discuss how individual entities examine the requirements of the law and make their compliance decision.

III. ECONOMIC MODELS OF CIVIL PENALTY ASSESSMENT

This chapter will be divided into four sections. The first section is both a review of the basis for the civil penalty as an enforcement tool as well as a review of significant work done on creating economic models to describe the legal compliance decision process. In the second section, the application of these models to the Coast Guard civil penalty assessment process will be examined. The third section discusses the test of the basic model and the fourth section is a summarization.

A. REVIEW OF PRIOR WORK

The review of the prior work done in this area will be organized by author rather than by content. Though the opposite is normally done, the works reviewed represent a *fairly comprehensive collection on the subject.* So many points are shared and the works are so often based on each other that review by author is more appropriate. Thus, this section will describe pertinent and unique aspects each author brought out in his or her effort.

1. Report of the Administrative Conference [Ref. 21]

The Administrative Conference of the U.S. was created "... to identify the causes of inefficiency, delay and unfairness in administrative proceedings affecting private rights, and to recommend improvements to the President, the agencies, the Congress, and the Courts." [Ref. 22] The Conference is held either yearly or biyearly. The main council of the Conference is chaired by and consists of ten presidential appointees who serve three year terms.

Federal administrative agencies, such as the Coast Guard, enforce many statutory and regulatory provisions for violation of which fixed or variable civil money penalties may be imposed. In fiscal year 1971, seven executive departments (including the Department of Transportation, the parent organization of the Coast Guard) and 13 independent agencies collected well in excess of ten million dollars, in over 15,000 cases [Ref. 23]. Indications were then, and have largely been confirmed by present data, that both the number of cases and the dollar magnitude would greatly increase [Ref. 24]. In fact, the "... civil money penalty had become one of the most widely used techniques in the enforcement programs of Federal administrative agencies ..." by 1979 [Ref 25].

The increased use of civil money penalties is an important and salutary trend. They have also proven to be an important alternative to criminal sanctions.

> "When civil money penalties are not available, agency administrators often voice frustration at having to render harsh all-or-nothing decisions, sometimes adversely affecting innocent third parties, in cases in which enforcement purposes could be better served by a more precise measurement of culpability and a more flexible response." [Ref. 26]

It was then envisioned that civil penalties would be especially appropriate in areas of safety and environmental concern, allowing an agency to more easily attain its law enforcement goals.

The Administrative Conference recognized that there is considerable forethought required when creating sanctions for a new law. In many instances, for example the Clean Water Act and the Federal Safe Boating Act of 1971, statutes may have both criminal and civil sanctions. The choice in sanctions both at the statute drafting stage and at the enforcement level has large consequences. Criminal penalties, though they

create nothing more than a dollar liability to the government as do civil penalties, expose an offender to the disgrace and disabilities associated with "convictions." Criminal convictions require special procedural and other protections and cannot be imposed administratively. The over-burdening of the courts argues against flooding them with controversies better handled by an administrative process [Ref. 27].

Criminal sanctions often create agency shortcuts, especially in the form of settlements. One estimate is that over 90% of violation cases are terminated by means of compromise, remission, or mitigation without ever going to a formal trial. The quality of settlements is a matter of concern. Regulatory needs are often sacrificed in light of what is collectible. The offender, on the otherhand, may be denied his procedural rights in a settlement [Ref. 28]. The Administrative Conference recognized the value of civil penalties and in its recommendation to Executive Agencies, encouraged their use.

2. Harvard Law Review, 1979 [Ref. 29]

Significant analyses of civil penalties as a statutory sanction were reported by the Harvard Law Review. Of specific interest in the analyses were statutes that carried both civil and criminal sanctions and the options they presented to the enforcing agency.

The reason for creating and enforcing a statute is critical to the entire law enforcement process. It is recognized that there is a large schism in law between criminal and civil sanctions. This was not a random development. "The basic aim of civil sanctions is deterrence; retribution is the province of criminal law" [Ref. 30]. Deterrence is

especially an appropriate goal in safety and environmental law enforcement programs. "Environmental sanctions ... do not emphasize retribution, rehabilitation, or incapacitation, but rather strive chiefly to ensure clean lakes and skies by making it undesirable to pollute in the first place." It appears that the basic aim of statutes with civil penalty provisions is "... not to punish morally culpable violators, but to deter undesirable conduct regardless of culpability" [Ref. 3].

Given deterrence as a goal, a basic tenet of a system of civil penalties would be to make it more costly to elect non-compliance than it would to elect compliance. "In a world of perfect enforcement, the penalty would need only be marginally greater than the profit gained by the entity as a result of the illegal activity." There are obviously imperfections in any law enforcement system. Not all violations can be detected. There is some probability of detection that exists or at least is perceived by the potential violator. That value of a civil penalty must be discounted by that probability. The potential violator then formulates an "expected value" of compliance and non-compliance. "For example, if a corporation would reap $100 profit from an illegal activity, but could be caught and punished only once out of every four times it engaged in such conduct, then the fine for each violation should be greater than $400" [Ref. 32].

The adoption of statutes with both civil and criminal sanctions is an advantage to a law enforcement agency. It might be argued that a sufficiently high level of deterrence would be achieved through assessment of civil penalties and that criminal sanctions, even simple criminal fines, are unnecessary. There are often, however, motivations that do

not fall into simple analysis as the aforedescribed example. Individuals may perceive intangible personal gain through illegal activity. This type of gain may not be deterred through a civil penalty. The criminal sanction would then still be available when needed to impose criminal sanction on morally "blameworthy and objectionable behavior." The civil sanction should be more than adequate for the large majority of cases, however.

3. Becker, 1968 [Ref. 33]

Becker begins his presentation with a discussion about crime. Two of the primary considerations in decisions about compliance are recognized as, first, the likelihood of detection if a person choses not to comply with the statute and/or regulations, and, second, the nature of the punishment if convicted. Becker points out that these factors are truly variables. An alleged offender may well encounter different probabilities of detection and conviction, and different punishments in different areas of the country. Also recognized is that obedience to the law is not taken for granted, and public and private resources must be expended to apprehend offenders. Becker's efforts are towards determining the optimal amount and type of resources and punishments used to enforce a law or regulation. To this end, a formulation of the social loss from an offense must be effected so that expenditures of resources and punishments combine to minimize the total cost to society [Ref. 34].

A common assumption with this effort and others to follow is that the person is basically seen as a rational actor. "The special theories of anomie, psychological inadequacies, or inheritance of special traits are dispensed with and the economist's usual analysis of choice is simply extended" [Ref. 35].

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Becker addresses a primary question about crime and law. "Usually, a belief that other members of society are harmed is the motivation behind outlawing or otherwise restricting an activity. The amount of harm tends to increase with the activity level." Becker assumes the individual to be a member of society that benefits from an illegal activity. The net cost or damage to society then is the difference between the harm and the benefit [Ref. 36].

With respect to the individual entity, we again have the two primary factors. First, the probability of detection and conviction is formulated. Second, the cost incurred as a result of conviction is formulated. Thus, there is a perception of expected value of non-compliance. Becker notes that in his review of all the diverse theories about law enforcement, there is general agreement:

"... that when other variables are held constant, an increase in a person's probability of conviction or punishment if convicted would generally decrease ... the number of offenses he commits. This generalized approach follows the economists' usual analysis of choice and assumes that a person commits an offense if the expected utility to him exceeds the utility he could get by using his time and other resources at other activities." [Ref. 37]

It is interesting to note that people with judicial experience view changes in probability of detection as having far greater impacts on compliance/non-compliance decisions than changes in the costs associated with detection and conviction [Ref. 38]. This suggests that an agency may not be able to simply increase the cost of non-compliance to the offender to make up for decreasing enforcement activity in the hopes of maintaining a steady expected cost of non-compliance.

Becker then brings these considerations together. "If the aim simply were deterrence, the probability of conviction could be raised

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close to 1.0 and punishments made to exceed the gain; in this way the number of offenses could be reduced almost at will" [Ref. 39]. Increasing the probability of detection creates a cost for society because more resources must be directed towards violation detection. What is needed is consideration to the damages to society from the crime in determining the proper amount of resources to devote to law enforcement. An optimal decision on enforcement levels would be one that minimizes the social loss. "This is the sum of damages, costs of apprehension and conviction, and costs of carrying out the punishments imposed which can be minimized simultaneously..." [Ref. 40].

With respect to safety and environmental law, the cost to society of non-compliance is very difficult to quantify. Nonetheless, the concept of optimization with respect to the net loss to society is an important one.

4. Ehrlich, 1973 [Ref. 41]

The primary thrust of Ehrlich's work is the development of a theory of participation in illegitimate activities and the testing of that theory against data on variations in indexed crimes.

Ehrlich follows the same initial reasoning as others, namely assuming the individual to be a rational economic actor, rather than using a criminal motivational technique. "A reliance on a motivation unique to the offender as a major explanation of actual crime does not, in general, render possible predictions regarding the outcome of objective circumstances." [Ref. 42]. Ehrlich hypothesizes that even if there is no one theory that dominates in the explanation of aberrant behavior, all individuals will respond to some form of incentives. To that end,

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his analysis examines not only costs of non-compliance but also the rewards for non-compliance.

Ehrlich perceives violations of law as potential increases in the violator's pecuniary wealth, his or her psychic well-being, or both. The violator also formulates an expected value based on the probability of detection and conviction, and the cost of conviction to the offender. Ehrlich views the potential violator's choice to be between compliance and non-compliance. These two activities are mutually exclusive and the individual makes his choice by comparing the expected utility of each one.

Ehrlich approaches the problem as a question of optimal enforcement based on the different types of indexed crime. The results of his testing showed the results to be consistent with the hypothesis, noting that there were numerous shortcomings in the crime statistics used. Data was often insufficient to make comparisons between different penalty assessment policy periods and the different impacts that different assessment policies had on the public. Interestingly, Ehrlich often found that enforcement activity was far beyond the optimal point given the societal loss of a particular crime [Ref: 43].

5. Goldberg and Nold, 1980 [Ref. 44]

In a more recent analysis, Goldberg and Nold examine one aspect of the generalized law enforcement theory. Certainly an agency's efforts towards detection of a violation appear to be the primary variable of the probability of detection. The authors, however, examine the increased use of private security companies and neighborhood cooperatives in detecting crime, as well as increased tendencies of victims to report crime.

The analysis and results of their study provided strong support

for the hypothesis that:

> "... perceived victim-specific self-protection efforts - here the
> probability that the victim would report the crime - deter burglars;
> households that are more likely to report crimes are less likely to
> be victimized." [Ref. 45]

The authors point out that in face-to-face crime, the potential violator

must evaluate the victim's probability of reporting the crime to deter-

mine the expected value of violating the law.

6. <u>Polinsky and Shavell, 1979 [Ref. 46]</u>

The authors in this effort attempt to take a micro view of the

primary deterrent variables, probability of detection and conviction, and

the cost of conviction. They agree with the generalization made by

Becker that holding all other variables constant, increasing either

variable should decrease the number of violations. The authors also

point out that for any given probability of detection, there can be a

cost of conviction sufficient to deter a potential violator. Changes in

the cost of conviction to the offender (in the case of a civil penalty,

the change in the amount of penalty assessed) occur at basically no cost

to the enforcing agency. Certainly there are costs associated with

increasing the law enforcement activity of the agency. The argument

might then be to minimize the law enforcement activity and maximize the

cost of conviction, thus maintaining an expected value of non-compliance

sufficient to make it the least preferred alternative.

The authors point out that a person's financial standing is yet

another primary variable. If the cost of conviction is beyond the wealth

of the individual, raising that cost will have little deterrent impact.

Further, entities are not usually evaluated as risk takers. "The possibility of risk aversion in an entity does not imply that they cannot be induced to make the same decision about engaging in the activity ..." [Ref. 47]. Risk aversion may demand, however, that the benefits of non-compliance be much higher than the costs of compliance.

The authors analyze economic models with and without consideration to the potential violator's wealth and risk aversion. They point out that optimal enforcement (used in the same sense as Becker used in his analysis) would differ greatly under the two circumstances. It was *hypothesized that where violators are, in fact, risk averse, the optimal* enforcement posture is one that increases the expected value of non-compliance primarily through increased enforcement activity, not increased cost of conviction.

Some assumptions are unique to this analysis. First it was assumed that a law-abiding citizen would not be unjustly penalized, i.e., not mistakenly fined. Also it was assumed that individuals had only two alternatives. They could either comply with the law or they could violate the law. In reality, an individual entity often has many choices other than these two which exist at opposite ends of the spectrum. There are many different levels of compliance and an individual may elect any one level in between total compliance and total non-compliance. An assumption is also made that individual wealth does not vary greatly. Of course it does, but in analyzing the impact of varying policies in the aggregate, an agency is likely to encounter similar cross-sections of wealth [Ref. 48].

7. Block, Nold and Sidak, 1981 [Ref. 49]

The final effort to be discussed centers around the formulation and testing of a model to describe behavior with respect to one specific type of law, namely an antitrust statute. It is not necessary to address the details of the statute involved. The aspects of the model will be identified, however.

The authors recognize that the risks and costs of prosecution are the primary deterrent factors. It is interesting to note that the statute involved has both civil and criminal sanctions but that the "... civil sanctions provide most of the sting...." of the enforcement process [Ref. 50].

What the authors consider in this model that others do not is that the probability of detection and the level of compliance chosen are not independent variables. In many circumstances, this can be a valid consideration. Certainly the more above the speed limit a driver goes, the more likely he or she is to be apprehended. However, this point is contingent upon different levels of compliance open to the person.

The authors are consistent with all aspects brought out in other models. They see the would-be violator (in this case, a group of businessmen examining price fixing options) chosing the alternative that maximizes utility. In the case of a profit oriented organization, the choice will be the alternative that maximizes profit.

The authors' points may have limited application to this thesis because in the majority of cases, the entity is seeking to minimize cost, not maximize profit. Nonetheless, it is important that they be addressed. Probably the most interesting comment in their effort is the recognition

given to the lack of "... national, or even regional, industries having identical products, costs, and demand conditions but varying levels of antitrust enforcement" [Ref. 51]. There simply is not a controlled set of conditions to accurately test their model. This is a critical problem in all works on the subject.

B. APPLICATION TO THE COAST GUARD

This section will examine how previous efforts of model development apply to the Coast Guard civil penalty assessment process. Areas not addressed in these previous models, but which are of significance in describing compliance with the law, will also be identified. It is not, however, the intent of this section to develop a new economic model to describe the compliance process for the statutes and regulations under consideration. This is unnecessarily complex for a comparative analysis. Also, it will be noted that differences between the MEP and RBS programs are significant in many respects. As such, the analysis will be done separately for each program rather than making an effort to combine the two programs in one analysis.

1. The Statutes and Regulations

The MEP and RBS law enforcement programs are in fact primarily deterrence-oriented. Though civil penalty provisions are associated with deterrence, both the primary laws involved in these law enforcement programs also carry criminal provisions. This thesis is not geared toward morally blameworthy conduct and criminal proceedings. The primary interest is in civil penalty actions. Civil penalty actions avoid the difficult questions of how to quantify the costs of imprisonment or the

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other costs of being "convicted." Further, criminal proceedings are beyond the control of the Coast Guard and in the author's opinion, are not effected with consideration given to optimal conditions of enforcement.

It is important to consider the main statutes of each law enforcement program under analysis. There is a distinct difference in what they require of those that are affected. First, the Clean Water Act proscribes a certain activity, namely the discharge of oil, in harmful quantities, into or upon certain waters and adjoining shorelines. It matters not how this activity is to be prevented, just that it is. Second, the Federal Boating Safety Act in large part requires certain things to be carried aboard a boat, though it also proscribes "Negligent Operation" of a vessel.

For purposes of this analysis, the Clean Water Act will be considered a performance statute in that it requires a level of performance sufficient to prevent a prohibited discharge of oil. The Federal Boating Safety Act will be considered to be mainly a physical requirement type statute in that it and the regulations developed or adopted under it require certain things, such as personal flotation devices and fire extinguishers, to be aboard a boat when it is in use.

2. The Entity

The term "entity" will be used to describe the person or organization subject to a statute or regulation. In the analysis of the RBS program, civil penalty cases only involve individuals while in the analysis of the MEP program, civil penalty cases are encountered against both individuals and organizations.

As did all authors of previous work, this thesis will assume that the entity is a "rational economic actor." The entity will select that alternative which maximizes its utility, whether it be through cost minimization or profit maximization. In making this selection, the entity will be assumed to have perfect information. This truly is a critical assumption and one that was made repeatedly throughout the previously discussed models. Perfect information includes even basic information about the statutory or regulatory requirements, as well as the expected cost of non-compliance.

Another important consideration pertinent to this thesis is that the entity does not simply have just two compliance alternatives from which to select. As Polinsky and Shavell (1979) pointed out in their work, in reality, there are many different compliance alternatives from which an entity may select. The RBS statutes and regulations are numerous and those entities detected in violation are often in violation of only one or two of many different requirements. The compliance decision is made with a nearly continuous spectrum of alternatives ranging from total compliance to total non-compliance.

The entity's wealth is not only an important consideration, it is a statutorily-mandated consideration in formulating an appropriate penalty. Both the Clean Water Act and the Federal Boating Safety Act require consideration to be given to the financial size of the entity in the case. Polinsky and Shavell (1979) appropriately point out that an entity's wealth is a prime determinant of the amount of risk that will be taken in chosing to elect non-compliance.

3. Coast Guard Activity

A discussion of Coast Guard enforcement activity and its relationship to the probability of detection is necessary. Up to this point, enforcement activity has had a very broad definition. As the data analysis will be conducted on Coast Guard data taken from a Coast Guard environment, it is useful to understand exactly what type of enforcement activity was undertaken.

First, the Coast Guard detects many violations through airborne and waterborne patrols, and from physical inspections. With respect to the MEP program, these activities are mandated by the Commandant of the Coast Guard in a Commandant Instruction [Ref. 52]. This Instruction specifies the number of inspections or patrols for certain activities and areas. In a similar manner, though without published guidelines, RBS inspections are mandated.

There are also other considerations in determining the enforcement activity. With respect to the MEP program, the Coast Guard receives a significant number of reports of violation from concerned citizens. Anyone can report a violation and a prohibited oil discharge is easily detected by many people. Thus, as indicated by Goldberg and Nold (1980), the probability of detection as perceived by the potential violator must be formulated based not only on the enforcement agency's activity, but also on the likelihood that a third party, victim or otherwise, will report a violation. Also, the Clean Water Act requires the entity violating the Act to report the violation to the Coast Guard himself.

In the RBS program, enforcement activity is somewhat affected by efforts of state and local agencies and of the Coast Guard Auxiliary.

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The Coast Guard Auxiliary conducts many inspections for compliance with the numerous boating requirements. Though Auxiliarists may only report that an owner or operator has violated Federal statutes or regulations, not cite him or her, they greatly enhance the image of enforcement activity and educate the public in the existence of Federal requirements.

4. Other Considerations

It is appropriate to identify factors which affect the compliance process that were not considered in previous work so that the results of the test of the economic models may be interpreted after knowing all factors which might have affected them. It may be impossible to account for them in this effort but their identification is useful.

There has been a distinction drawn between physical requirement and performance statutes and regulations. After a review of the case files involved in this analysis, it was noted that violations of performance statutes or regulations were usually unintentional. This is understandable. There is nothing to be gained by electing non-compliance with the Clean Water Act. An entity loses in every respect, other than foregoing the inconvenience related to effecting precautions necessary to prevent a discharge. With respect to physical requirement statutes and regulations, such as in the RBS program, there are direct costs avoided when an entity elects non-compliance. These avoided costs are easily calculable. Further, when an entity elects non-compliance, he is without doubt, violating the law. As such, it is hypothesized that with physical requirement statutes and regulations, violations tend to be much more intentional.

It is also important to realize that there are non-controllable factors involved which contribute to violations of the Clean Water Act.

The total set of circumstances that lead to a violation can vary greatly in the case of the Clean Water Act while violations under the Federal Boating Safety Act tend to occur under identical and indefensible circumstances. There is never a guarantee that precautions taken to avoid a prohibited discharge of oil will be successful. Success can be a factor of things such as weather, third party involvement, or "Acts of God." This is one additional reason for dividing the analysis along program lines.

The RBS physical requirement regulations were established after careful thought and public rulemaking. There are very important safety reasons for their existence. There is an implied cost of non-compliance, at any level, because if required equipment is not on board when it is needed, e.g., a personal flotation device required to assist a person lost overboard, the cost of non-compliance can be very high. It may in fact cause the needless loss of life. The large majority of boaters do not deny the purpose of required equipment and registration. This recognition fosters compliance in itself.

This implied cost associated with needing required equipment and not having it is likely perceived by many boaters. It is a function of an individual's awareness of the purpose of the regulations. This awareness can be affected greatly by education efforts of the Coast Guard, Coast Guard Auxiliary, and other organizations. Certainly the more aware a boater is of the need and purpose of required equipment, the more likely he or she is to comply, all other things held constant.

There can also be other costs associated with non-compliance. In the case of discharged oil, the lost oil may have marketable value. In many circumstances, a prohibited discharge of oil occurs because of

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another regrettable but not illegal event. One scenario frequently encountered in real life is a boat sinking. Fifty gallons of gasoline might be lost and the owner will receive a civil penalty, regardless of fault. Nonetheless, the loss of the boat would likely far overshadow the cost of non-compliance and the cost of lost oil, and make the impact of the penalty minimal. Another cost, and in fact probably the biggest deterrent cost of the MEP program, is that the entity responsible for a prohibited discharge must also contain and remove the oil from the water or adjoining shorelines. This cost of responding to the oil discharge is often much greater than the sum of the civil penalty assessed and the cost of lost oil.

Finally, there is the consideration of monetary inflation when examining different time periods such as in this analysis. For identical circumstances, fifty dollar penalties assessed at times three years apart will have a different deterrent effect on an entity. This must be taken into account. (Note: For this reason, many statutes are amended period-ically to update the penalty provisions to reflect monetary inflation. This did not occur during the analysis period for any penalty provision, however.)

C. TEST OF THE BASIC MODEL

The analysis will examine the two primary factors involved in the compliance decision model, namely the penalties and probability of detec-tion. If the level of civil penalties assessed is higher in one period than another, it is to be expected, ceteris paribus, that the number of violations detected should be smaller. When comparing these time periods,

however, the Coast Guard enforcement activity levels must be considered. Compliance decisions are based on both.

Previous work in model development has identified other factors which can affect the compliance decision process. In analyzing two different time periods and the effect that a different level of assessed civil penalties may have had in deterring potential violators, many factors would remain constant and have no impact. All assumptions regarding factors other than the level of penalty assessed and enforcement activity will be addressed.

Before continuing on with a discussion of the data and the analysis, it is appropriate to consider a basic model of the civil penalty assessment process. First, it is assumed that the entity does have perfect information about its whole spectrum of compliance alternatives and can formulate an expected cost of non-compliance for each alternative. The entity also incurs direct costs for the level of compliance selected. It will be assumed that the cost incurred by an entity for a certain compliance level guarantees the entity that level of compliance. (It has been mentioned that this may not always be the case in performance type regulations where there is not always a guarantee of success.)

The entity experiences decreasing marginal utility from his or her expenditures on compliance. The entity will therefore seek that level of compliance expenditure where incremental expenditures no longer produce a commensurate reduction in the expected cost of non-compliance.

The expected cost of non-compliance formulated by the entity is based on the probability of detection and penalty assessment, and the actual penalty itself. These factors can be thought of as the enforcement

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posture of an agency. The Coast Guard decides how many resources to devote to enforcing certain statutes and regulations and what penalty to assess against violators. Should the Coast Guard increase its enforcement posture, thereby increasing the expected cost of non-compliance, the entity will realize that incremental compliance expenditures will in fact result in greater than or equal reductions in expected costs of non-compliance. The entity would therefore be motivated to increase his or her compliance level.

D. SUMMARY

This chapter addressed many theoretical and empirical efforts to describe the compliance process. The unique factors which must be considered in this effort were also discussed. The next chapter will present the structure of the data collected and the methods used to assess the significance of the data. Critical to the data analysis will be a discussion of the assumptions made.

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IV. DATA ANALYSIS

This chapter will be presented in four sections. The purpose of this chapter is to examine the potential for testing the basic legal compliance process model and to then effect an analysis of available data. The first section explains the sources of data and how the data were recorded onto data files. The second section will describe the methods used to analyze the data. The third section reports the results of the data and discusses possible interpretations. The fourth and final section summarizes the data analysis effort.

A. DATA RECORDS

The data for this analysis were obtained from the Office of the Commander, Eleventh Coast Guard District. Data about each program were obtained from the separate program managers and also by an extensive review of past civil penalty case files. The civil penalty case file was the sole record that contained factors considered by the Hearing Officer in determining the final outcome of a particular case. It is realistic to assume, however, that factors other than those addressed in the case file were also considered. Often, the case files did not contain enough information for the Hearing Officer to consider those factors mandated by law, let alone other appropriate considerations. Nonetheless, for the purposes of determining penalty assessment policy, there is no other information source that is as comprehensive as the case file.

The data extracted from the civil penalty case files were recorded on SPSS (Statistical Package for the Social Sciences) data files. Subfiles

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were created within each program to separate the three regimes of Hearing

Officer data.   Those subfiles are labelled as follows:

PREWNDT - data *from cases processed prior to the author's regime as
Hearing Officer*

WENDT   - data *from cases processed during the author's regime as
Hearing Officer*

PSTWNDT - data *from cases processed after the author's regime as
Hearing Officer.*

1. The Case Files

A short discussion of case files from each program will be made

followed by the information retrieved from the case files.

a. RBS Case Files

The RBS case files basically go back to June, 1978 because

cases are eligible for disposal once older than three years and the files

are purged monthly.   The data was collected in June of 1981.   Some cases

that went back to April of 1978 were encountered, however.   They remained

in the files because of oversight but were still valid for this data

collection effort.   A sample of 288 cases was taken.   The case files were

filed serially by state driver's license number, not by any date.   It was

difficult then to take a sample which reflected the Hearing Officer

regimes.   It was decided to take as large a sample as possible.   The

number of cases examined in this effort was limited only by the amount of

time available to the author on his data collection trip.

All case files were considered except those involving boat

manufacturers who allegedly violated construction standards, and cases

involving Negligent Operations other than boats that ran out of fuel and

required assistance.   Negligent Operations is a very subjective deter-

mination and there are many and varied factors which might consititue

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Negligent Operations from time to time. The most common finding of Negligent Operations involved the boat operator failing to provide sufficient fuel for his voyage and thus requiring Coast Guard assistance. This scenario is common and the circumstances are similar enough that this violation was included in the analysis.

For each violation case, the value of the following variables was recorded. A parenthetical entry with a variable indicates the values the variable could take.

CASEID - the serial number assigned to the case by the Coast Guard.

VIOLDT - the date the violations were detected.

NOTDT - the date an initial notification letter was mailed to the alleged violator. This data allows cases to be separated by Hearing Officer as there was only one Hearing Officer at any one time.

PRIORS - whether or not the alleged violator had a record of other violations. It was felt that this would likely increase the penalty for any case. (0,1)

ENFSRC - the type of unit that submitted the Report of Violation, either a RBS unit, a Search and Rescue unit, or another law enforcement unit. (0,1,2)

WATERS - the type of waters where the violation was detected, either coastal or inland, the latter being typically the Colorado River. (0,1)

NUMREG - the number of numbering or certificate violations. (0 and up)

NAVEQP - the number of navigation equipment violations. (0 and up)

SAFEQP - the number of safety equipment violations. (0 and up)

NOOOF - if there was a Negligent Operations citation for running out of fuel. (0,1)

TOT - the total number of violations. This was of interest because it is likely that Hearing Officers recognize that compound violations create compound hazards and a higher

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penalty should be assessed. That is, for two violations, the penalty should be higher than the sum of the penalties for the individual violations occurring in isolation from each other, ceteris parabus. (1 and up)

HRNG - whether or not the alleged violator requested a Hearing. (0,1)

WRTRSP - whether or not the alleged violator submitted a written response to the allegations. (0,1)

PROPEN - the proposed penalty contained in the initial notification letter to the alleged violator. (0 and up)

FINPEN - the final penalty, if any, that was assessed in the final action in the case. (0 and up)

COMPEV - whether or not the alleged violator submitted evidence that he had quickly gained compliance with the requirements after notified that he was in violation. (0,1)

DISMIS - whether or not the case was dismissed. (0,1)

REMAND - whether or not the case was remanded to the program manager for any of numerous reasons. (0,1)

The case files contained no other useful information. RBS case files are typically very brief largely because a boat operator either is or is not in compliance and there are few mitigating circumstances.

    b. MEP Case Files

The MEP case files go back to January, 1978. Though eligible for disposal after three years, as are the RBS cases, the MEP files are purged yearly, not monthly. A sample of 244 cases was taken. The object was the same as with the RBS data collection effort, namely, to collect as much data as possible. The MEP cases files are filed, however, by date. Thus, an effort was made to review similar numbers of cases for each Hearing Officer.

MEP case files are typically more complex than RBS case files. The determination of gravity consists of many factors, both

objective and subjective. All objective measures were extracted from the case files.

In simplifying the analysis, only cases involving Coast Guard investigated reports were considered. The EPA cases were rejected. Further, cases where allegations or findings of "Act of God" causation were made were also rejected. The aim was to find cases where information contained therein could easily be evaluated and recorded.

For each case file examined, the following information was recorded. Again, parenthetical entries indicate the values a variable could be assigned.

CASEID - the serial number assigned to the case file by the Coast Guard.

SRCTYP - the type of source that the discharged oil emanated from. This category included vessels, waterfront facilities, oil development efforts, both onshore and offshore, and oil transportation facilities. It was felt that these five sources might represent different communities of entities and that analysis for each may be more enlightening. (0,1,2, 3,4)

VIOLDT - the date of the violation.

NOTDT - the date the notice of violation was sent to the alleged violator.

ENFSRC - the unit that submitted the report of violation, either Port Safety Detachment Santa Barbara, Marine Safety Office Los Angeles/Long Beach, or Marine Safety Office San Diego. (1, 2,3)

WATERS - the type of water, inland or coastal, where the violation occurred. (0,1)

ENTSZE - the financial size of the entity. Although there is rarely enough information in case files to assess the financial size of the violator, this consideration was important to the analysis. Rather than rejecting it totally, individuals were coded in one group, large ship owners and large oil companies in another group, and all others in a third. This reflects an attempt to at least group the small and the big entities. It is unlikely that Hearing Officers do any further categorization. (1,2,3)

QNTDIS - the actual quantity of oil discharged in the violation. This is a prime factor in determining gravity of the violation. (1 and up)

PRIORS - if the alleged violator had a record of other violations. (0,1)

HRNG - whether or not the alleged violator requested a Hearing. (0,1)

WRTRSP - whether or not the alleged violator submitted written evidence for consideration. (0,1)

PROPEN - the penalty proposed in the initial notification letter. (1 and up)

FINPEN - the penalty, if any, assessed in the final action in the case. (0 and up)

PPRCTR - whether or not a violation of the Pollution Prevention Regulations (PPR) was contributory to the prohibited discharge. The PPRs are regulations promulgated under the Clean Water Act. The Coast Guard feels that a violation of these regulations, in addition to subjecting an entity to separate penalty action, also adds to the gravity of the violation and should be considered in a finding of gravity in a case. (0,1)

DISMIS - whether or not the case was dismissed. (0,1)

REMAND - whether or not the case was remanded to the program manager. (0,1)

2. Violation Activity Measurement

The prime measure in evaluating the impact of a penalty assessment policy is the number of violations that occurred as a result of the policy. There are two important decisions in arriving at this measure. First, what is the appropriate time period in which to evaluate the impact of a penalty assessment policy? Second, how is the number of violations to be measured?

The time period factor must be chosen so that it adequately reflects the policy of a Hearing Officer. A penalty assessment policy,

especially one that is significantly different from the previous policy, does not affect entities immediately. There is some time lag because information about the policy must be disseminated and comprehended. This is not done formally. It is done mainly by violators relating the final action in their case to other potential violators.

The table below shows both the effective dates of the Hearing Officers and the periods selected to assess the impact of their penalty assessment policies. Allowance has been made for the penalty assessment policy to be recognized by potential violators.

Hearing Officer Regime	Impact Period
PREWNDT, 1 JUL 77 to 31 JAN 79	1 JAN 78 to 31 DEC 78
WENDT, 1 FEB 79 to 1 JUN 80	1 JUL 79 to 30 SEP 80
PSTWNDT, 1 JUL 80 to 1 JUL 81	1 JAN 81 to 30 SEP 81

The only problem with the Impact Periods is that identical 12-month periods could not be selected for comparison to prevent seasonal fluctuations from contaminating other effects. An assumption is made that the data analysis methods selected will not be hampered by this problem because comparisons will be based on proportions and ratios, not absolute violation activity.

The second factor is more difficult to cope with. First, there is no way to assess the total number of RBS violations that existed in the Impact Periods. The measures used do in large part relate the total violation activity, however. The first measure is the proportion of inspections where violations were detected. The second measure is mean

number of violations per inspection where violations were detected. The third measure is the ratio of total violations to total inspections. These measures reflect proportions or per unit numbers so that comparisons between periods with different activity can be made. If these measures are significantly different beween Impact Periods, it may be an indication that different policies have had different impacts.

With respect to the MEP analysis, it is again difficult to assess the significance of the number of prohibited discharges of oil without some reference to the total potential discharges. There is no way to know how many "potential" discharges there were in the impact period. The measures used, however, do make some attempt to establish a base level of activity. A review of the MEP case files indicate that the cause of prohibited discharges is related more often than not to oil transfers of some sort. Relating violation activity to the amount of oil transferred in a period should give an indication of the impact of a penalty assessment policy. The two measures used are the proportion of oil discharges to the total amount of oil transferred, and the ratio of violation cases generated to the total amount of oil transferred.

3. Enforcement Activity

The activity levels will be discussed separately for each program area since they are determined in very separate ways. Enforcement activity is an essential consideration in evaluating penalty assessment policies. The entity not only examines penalties assessed for detected violations, but also the probability of detection. The probability of detection relates in large part to the activity of the enforcing agency with respect to a specific program.

a. RBS Activity

The basic activity level in the RBS program is number of vessels inspected. Nonetheless, as an entity formulates a probability of detection, the RBS activity must be considered in light of the number of times boats are in use. It is a simple matter to derive the number of inspections the Coast Guard made for compliance with RBS statutes and regulations in the study area. It is impossible to determine the total number of times individual boats were put in use. The measure that might have been the most appropriate would be the ratio of RBS inspections to the total number of boats registered in the states of the study area. Although the number of registered boats is not a figure wholly indicative of the number of times boats are used, it is the best measure available. Unfortunately, it was not available in a form that would allow a period by period impact comparison. It was available by a calendar year summary. Therefore, some attempt will be made to account for trends in this ratio.

b. MEP Activity

The MEP activity level is even harder to assess. There is no inspection made on a vessel or any other entity for pollution. There are patrols for pollution and there are reports received indicating someone, usually the caller, has discharged oil in violation of the Clean Water Act. Another confounding factor is that it may be easy to prove a violation occurred but very difficult to prove who did it.

It will be assumed that the activity level of the MEP program relates directly to the proportion of reported or detected discharges where an entity is found to be the responsible party. While there certainly are many other reasons, such as conscience or public image, which

lead to the discovery of a responsible party, the entity will be assumed to formulate a probability of detection and penalty assessment based on the Coast Guard's success in finding the discharger. This ignores the oil discharges that occur but are never reported or discovered, and admittedly there may be a significant number. Further, a discharge of oil in a boat marina and one ten miles out to sea have vastly different probabilities of detection. Nonetheless, these factors are all but impossible to account for and the assumption holds.

B. DATA ANALYSIS METHODS

This section will be divided into three subsections. The first outlines the methods used to determine and compare the different penalty assessment policies, while the second and third address the violation levels and enforcement activity respectively.

1. Penalty Assessment Policy

Regression analysis will be used to determine the penalty assessment policy of each Hearing Officer regime. The SPSS regression program will be used for this task. A TI-59 programmable calculator will also be used for computations not within the scope of the SPSS programs.

There are numerous variables that could be regressed against the dependent variable. Only those with some causative and significant relationship to the dependent variable will be selected. These will be identified in Appendix C along with the total set of results from the regression analyses. There will be two sets of regressions done for each program. One will use PROPEN, the proposed penalty in the case, and the other will use FINPEN, the final agency action in the case.

A CHOW test will be the primary analytical tool used in two of the three tasks of this first data analysis effort. A CHOW test is a statistical technique that determines the significance of the difference of two or more regression equations. It does this through the computation of an F-statistic as indicated in Figure 1.

The term RRSS and URSS deserve further explanation. Suppose that the variable WATERS is considered for inclusion into the regression analysis for the RBS data file. How can it be determined a priori that it is a significant variable? First the data file is divided into those cases where WATERS=0 and those where WATERS=1. Regression analysis is effected on each subset using independent variables that are certain to have a causal and significant effect. The regression analysis will produce the residual sums of squares for each subset. The sum of these two figures equals the URSS which is used in the CHOW test equation. A third regression analysis is run using the whole RBS data file without regard to the variable WATERS. The residual sums of squares from this

$$F = \frac{(RRSS-URSS)/(k+1)}{URSS/(n1-n2-2k-2)}$$

Where RRSS = the restricted residual sums of squares

URSS = the unrestricted residual sums of squares

k = the number of regressors in the analysis

n1 = the number of observations in data set 1

n2 = the number of observations in data set 2, and

F = the statistic with distribution
$((k+1),(n1+n2-2k-2))$

Figure 1. CHOW Test

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regression analysis equals the RRRS in the equation. If significantly different regression equations are generated by the regression analysis on the data subsets, the variable will be included for further analysis. Significance is determined by examining the probability value associated with the F-statistic generated by the CHOW test. The same test will be used to assess the difference in regression analysis effected for the data subfiles which represent different Hearing Officer policies. [Ref. 53]

In the first task, all three data subfiles (PREWNDT, WENDT, and PSTWNDT) were run together. The goal was to determine whether or not certain dummy variables which might have a causal relation to the dependent variables, should be created in the subfile regression task. Those variables nominated for possible conversion to dummy variables were as follows:

RBS Program-WATERS (0,1) and ENFSRC (0,1,2)

MEP Program-WATERS (0,1), ENFSRC (1,2,3), ENTSZE (1,2,3)

In the first task, if the F-statistic revealed a difference significant at the alpha = .01 level, a dummy variable would be created and included as an independent variable for the subfile regression analysis. In the second task, after separate subfile regressions were effected including certain dummy variables, comparisons could be made, again using the CHOW test, to see where significant differences between regressions existed. If there were such differences, it would be appropriate to conclude that there was a significant difference in penalty assessment policies.

One other test would be required. The CHOW test shows where significant differences exist, but not necessarily in which direction the

difference is. To determine whether or not different assessment policies were higher or lower than each other, a T-test was needed. The T-test would examine the mean penalty and standard deviation assessed by a Hearing Officer and compare it to the mean predicted penalty and standard deviation based on the regression equation developed for another Hearing Officer and using the case file data of the first Hearing Officer. This would reveal both the significance of any difference and which Hearing Officer assessed larger penalties.

To account for inflation, some factor would be needed to equate penalties and predicted penalties in this comparison. A factor of 15% per year was used. It is felt that this factor, which is an overcompensation, would make the comparisons very conservative as would the alpha level of .01.

2. Violation Activity Measurement

There is no way to statistically test the significance between violation levels as evaluated by the measures selected. These measures will be presented in tabular form and qualitative judgements made about the differences.

3. Enforcement Activity

As discussed in the earlier section IV.A.3, there is no perfect way to measure enforcement activity. The measures selected will be presented but again, there is no way to measure the statistical significance of these differences. As such, qualitative judgements will be made. One table and one graph will be presented and conclusions made from them.

C. DATA ANLAYSIS RESULTS

The results of the analysis will be presented by program. The re-
sults of the numerous regressions to determine which nominated variables
should be converted to dummy variables will not be presented. Their in-
clusion in the final regressions is evidence that they were considered
significant for the final subfile analyses.

1. RBS Data Analysis Results

Appendix C lists the six different regressions run for the RBS
data file. One is for each subfile, once using PROPEN as the dependent
variable, and once using FINPEN as the dependent variable. All six
regressions resulted in significant regression equations at the .01
level. The R squared numbers achieved in the analyses were generally
very acceptable given there are qualitative judgements made by Hearing
Officers that can neither be quantified nor extracted from the case
files. When comparing the regression equations with each other, as
depicted in Appendix D, several conclusions could be drawn.

Using the CHOW test, the assessment policies of both WENDT and
PSTWNDT proved to be significantly different from the PREWNDT policy, in
both the FINPEN and PROPEN runs. Comparisons of WENDT and PSTWNDT as-
sessment policies revealed no significant differences. Using the T-test,
however, the results were not quite so clear cut. In general, in both
the FINPEN and PROPEN runs, PREWNDT and WENDT assessment policies were
significantly different from each other, both with and without inclusion
of the inflation factor. In this comparison, penalties assessed under
the WENDT assessment policy were higher. Significant differences were
also detected between PSTWNDT and PRWNDT, with the PSTWNDT assessment

policy assessing higher penalties. These differences were not evident when accounting for the inflation factor, however.

It may be concluded that the differences in the penalty assessment policies between the Hearing Officers, especially the difference between WENDT and PREWNDT, are sufficiently significant to suspect different violation activity. Thus, the violation activity that existed during the impact periods will be examined to see if the entities followed the basic economic model. The results of the violation analysis follow in Table 1, with data extracted from Appendix E. "Im. Pr." stands for the assessment policy impact period. "Iv/I" denotes the ratio of inspections that resulted in violations detected to the total inspections. "TV/Iv" denotes the mean number of violations detected per inspection where some violation was detected. "TV/I' denotes the ratio of violations detected to all inspections.

Table 1. RBS Violation Activity

Im. Pr.	Iv/I	TV/Iv	TV/I
PREWNDT	.4577	1.7860	.8166
WENDT	.5573	1.7162	.9565
PSTWNDT	.5469	1.9030	1.0408

This table shows what appears to be a marked increase in the two measures Iv/I and TV/I from PREWNDT to WENDT, with a leveling off during PSTWNDT. The third measure, TV/Iv, shows a decrease between PREWNDT and WENDT but an increase during PSTWNDT. Though there is no way to make a statistical conclusion about these measures, they appear to be moving opposite to the direction anticipated. Since the WENDT assessment policy is definitely higher than PREWNDT, a decrease in violation activity would have been anticipated. Similarly, the difference between the assessment policies of PREWNDT and PSTWNDT would suggest a decrease though perhaps not as strong. In either case, the data does not support the changes forecast by the basic model.

It is then appropriate to examine the enforcement activity in the RBS program. Data again is extracted from Appendix E and is summarized in Table 2. The data were not configured to give a period by period impact comparison, but are arranged by calendar year. The term "I/TBR" is the ratio of total RBS inspections made for that year to the total boat registrations in the states that surround and lay over the study area.

Table 2.   RBS Enforcement Activity

Year	I/TBR
1978	.004909
1979	.004697
1980	.003144

Again, it is difficult to assess the significance of this steady decreasing trend. Nonetheless, it is not unreasonable to argue that by this measure, a boater in 1978 had a fifty-six percent better chance of being boarded than he would in 1980. This may have accounted for the actual rise in violation activity even in light of a higher level of assessed penalties. If the entity viewed the decreased probability of detection as far more significant than the higher penalties, a lower expected cost of non-compliance may have been perceived.

2. MEP Data Analysis Results

The results of the six basic regression analysis are contained in Appendix C. All regressions resulted in an F-statistic significant at the .01 level. The R-squared's achieved were not as high as in the RBS analysis. This is to be expected because many more factors involved in the penalty decision are qualitative. The comparisons made between the regression equations are addressed in Appendix D.

The FINPEN analysis proved to be more conclusive than the PROPEN analysis in the CHOW test comparisons, with all three subfiles yielding significantly different regression equations. In the PROPEN analyses, only WENDT and PSTWNDT proved to be significantly different. In the T-test comparisons, the FINPEN analyses again proved to be more conclusive. Penalty assessment policies of WENDT and PREWNDT were significantly different with and without the inflation factor, the WENDT assessment policy being higher. WENDT and PSTWNDT also proved to be significantly different assessment policies with WENDT again being the higher assessment policy, both with and without the inflation factor.

In the PROPEN analysis, WENDT and PREWNDT proved to be signifi-
cantly different both with and without the inflaction factor, WENDT being
the higher assessment policy. Also, WENDT and PSTWNDT were significantly
different with and without the inflation factor, with WENDT again being
the higher assessment policy. The sum of these comparisons would lead to
the conclusion that both before and after WENDT, the assessment policies
created smaller penalties. This might better isolate the impact of the
WENDT policy if other factors do not confound it. This impact, according
to the basic model, should be decreased violation activity in the WENDT
impact period as compared to either the PREWNDT or PSTWNDT impact periods.

The violation activity presented in each of the impact periods is
presented below in Table 3. The data were taken from Appendix F. "Im.
Pr." denotes the impact period for each Hearing Officer regime. "DR/QOT"
denotes the ratio of the number of prohibited oil discharge reports and
detections to the quantity of oil (bbls. x 1,000,000) transferred.
"QOD/QOT" denotes the ratio of the quantity of oil discharged (bbls.) to
the quantity of oil (bbls. x 1,000,000) transferred.

Table 3. MEP Violation Activity

Im. Pr.	DR/QOT	QOD/QOT
PREWNDT	2.5528	23.5948
WENDT	1.6398	4.1075
PSTWNDT	2.4457	3.7798

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These figures tend to support the conclusion that less oil was discharged during WENDT than PREWNDT, when using the QOD/QOT measure. Also, when examining the DR/QOT measure, there appears to be a marked decrease from PREWNDT to WENDT. Both measures changed as predicted by the basic model. In comparing WENDT and PSTWNDT, it can be seen that while the QOD/QOT measure decreased slightly, the DR/QOT measure increased significantly, nearly returning to the PREWNDT level. The later measure changed as predicted by the basic model.

Figure 2 represents a graph of MEP Enforcement Activity with time on the X-axis and "VRS/DR", the proportion of all reports or detections of discharged oil that result in a violation report being submitted, on the Y-axis. This graph reveals a steady trend of an increasing VRS/DR. This would likely mean a steadily increasing probability of detection and penalty assessment as perceived by entity. The asterisks are the actual data points as plotted. The line drawn on the graph is a plot of the equation which resulted from a simple linear regression analysis run on the data. It would appear that this trend is steady enough that the marked changes detected in the violation activity measures are due to assessment policy, not enforcement activity.

D. SUMMARY

This chapter presented the data sources used in the analysis and the manner in which the data were transposed to computer files. The methods used in the data analysis were identified as were all necessary assumptions. Finally, the actual data results were presented. The output of all the separate analyses are contained in the appendices and it was not

necessary to repeat them in this chapter. Only pertinent extractions were made. The conclusions drawn from the analysis will be addressed in the final chapter.
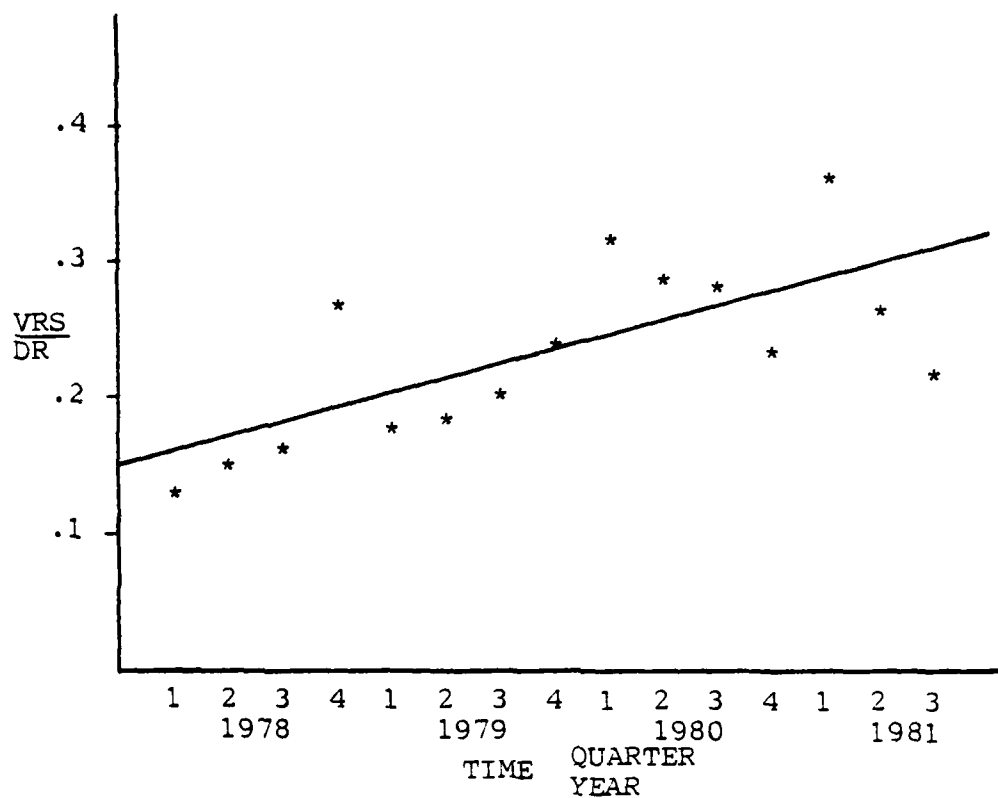

Figure 2.   MEP Enforcement Activity

V. CONCLUSIONS

The missions of the Coast Guard's main law enforcement programs have been identified. The statutes and regulations pertinent to these missions have been addressed. A comprehensive review of literature which dealt with economic models to describe law compliance processes was presented. It was predicted, based on these models, that if the level of penalties assessed was elevated, entities would be encouraged to expend more resources on compliance and therefore, fewer violations would be committed. Any analysis must, however, take into account the enforcement activity of the Coast Guard when interpreting the results. The probability of detecting violations is a function of enforcement activity. For an entity to formulate an expected cost of non-compliance, he or she must know both the cost of being detected and the probability of being detected.

The study area selected was the Eleventh Coast Guard District, largely because of data availability and access. Also, the author was the former Hearing Officer of the Eleventh Coast Guard District and based on his personal judgement, there were very different penalty assessment policies in existence before, and possibly after, his tour there. Further, there would likely exist difinitive measures that would allow a comparison of the impacts of these different policies. As stated, there rarely exists a very controlled set of circumstances that allows for a definitive test of the economic models, but it was believed that the last three years of data from the Eleventh Coast Guard District would provide just such a set of circumstances.

The test of the basic model was effected separately for the two programs analyzed. The entities involved in each program are different as are the statutes and regulations. The data available were sufficient to allow for the separate analyses and the results were likely to be more meaningful because the enforcement activity in each program was scheduled independently. Thus, the effect of the assessment policy and enforcement activity for each program would not be obscured by the policy and activity of the other.

The penalty assessment policies were determined through regression analysis. Variables, based on information extracted from actual case files, were regressed against the penalties in the case file. Both the proposed and final penalties were used as the dependent variable. Comparisons of the policies were effected through the use of the CHOW test and the T-test. The impacts of the policies were measured in periods which allowed time for entities to become cognizant of the policy, especially where it had changed significantly. Impacts were assessed using the best violation measures available. The enforcement activity, the other prime input to violation activity measurement, was also assessed. The measures here were also imperfect, but represent the best available.

The analyses revealed, as had been suspected, that there were significant differences in the penalty assessment policies of three different regimes of Hearing Officers. These differences existed at an alpha = .01 level and using an inflation factor of 15 percent. Thus, the results should be conservative and conclusive.

In the Recreational Boating Safety (RBS) law enforcement program, the assessment policy of the author (WENDT) proved to create significantly

higher penalties than the policy of his predecessors (PREWNDT). The enforcement activity measures also show, however, that going from PREWNDT to PSTWNDT (the successor to the author), enforcement activity declined significantly. Thus, it is difficult to analyze the differences in violation activity. It is proposed, however, that the definite increase in violation activity is the result of decreased enforcement activity. Thus, the expected cost of non-compliance was lowered by a decreaseing probability of detection, in spite of higher levels of assessed penalties in the later periods, and higher violation activity resulted.

In the Marine Environmental Protection (MEP) law enforcement program, the WENDT assessment policy proved to create significantly higher penalties than both the PREWNDT and PSTWNDT assessment policies. Unlike the RBS program, the enforcement activity measure showed a steadily increasing trend over the impact periods. In examining the violation activity, there appears to be significantly lower levels during the WENDT impact period, when the level of penalties assessed was highest. This agrees with the basic model and it is proposed that there was, in fact, a cause and effect relationship between assessment policy and violation activity. The enforcement activity, although different for each impact period, was not different to a degree that should have obscured the impact of the different policies. Even when considering enforcement activity, the violation activity did appear to react significantly, in all comparisons, to the different assessment policies.

The results of this analysis are useful. They show that the expected cost of non-compliance is affected by both the level of assessed penalties and the Coast Guard's enforcement activity. Where there is no

radical change in enforcement activity, incremental changes in assessment policy should bring about changes predicted by the basic model. Where there is a radical change to the enforcement activity, increases in the level of assessed penalties can not be counted on to maintain a constant level of expected cost of non-compliance. Enforcement activity, which is the prime determinant of probability of detection, appears to be a more important factor in the level of compliance an entity elects.

The Coast Guard maintains nearly all of the data used in this analysis. It is possible for the data to be collected and used as it was in this analysis on a routine basis. Resources could be directed to or away from certain units, or changes in assessment policies could be proposed, that would more effectively carry out the basic mission Coast Guard law enforcement programs, namely deterrence. A secondary function of such analyses would be to maintain a uniform enforcement posture within a Coast Guard district, or throughout the entire Coast Guard. This could not be done without some cost, however. The determination of the cost effectiveness of such a program would be a policy decision appropriate for the Commandant of the Coast Guard. Nonetheless, it could be the first step in providing some useful guidance to District Commanders and their Hearing Officers in the optimal assessment of civil penalties.

APPENDIX A

VIOLATION CASE FLOW

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                        ┌──────────────────────┐
                        │      COMMANDER       │
                        │      ELEVENTH        │
                        │ COAST GUARD DISTRICT │
                        └──────────┬───────────┘
┌──────────┐                       │
│ HEARING  │───────────────────────┤
│ OFFICER  │                       │
└──────────┘              ┌────────┴─────────────────────────┐
                   ┌──────┴───────┐                   ┌───────┴──────┐
                   │    CHIEF     │                   │    CHIEF     │
                   │ MARINE SAFETY│                   │     RBS      │
                   │   DIVISION   │                   │   DIVISION   │
                   └──────┬───────┘                   └───────┬──────┘
          ┌───────────────┼───────────────┐                  │
     ┌────┴────┐     ┌────┴────┐     ┌─────┴───┐             │
     │  CHIEF  │     │  CHIEF  │     │  CHIEF  │             │
     │   MEP   │     │   PSS   │     │   CVS   │             │
     │ BRANCH  │     │ BRANCH  │     │ BRANCH  │             │
     └────┬────┘     └────┬────┘     └─────────┘             │
          └───────┬───────┘                                  │
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┌────┴──────┐ ┌───┴──────┐ ┌───────────────┐ ┌─────────────┐
│PORT SAFETY│ │  MARINE  │ │    MARINE     │ │   BOATING   │
│DETACHMENT │ │  SAFETY  │ │    SAFETY     │ │   SAFETY    │
│  SANTA    │ │  OFFICE  │ │    OFFICE     │ │ DETACHMENTS │
│ BARBARA   │ │ SAN DIEGO│ │ LOS ANGELES/  │ │             │
│           │ │          │ │  LONG BEACH   │ │             │
└─────┬─────┘ └────┬─────┘ └───────┬───────┘ └──────┬──────┘
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          ┌────────┴───────────────┴────────────┐
          │              Reported               │
          │                 or                  │
          │              Detected               │
          │             Violations              │
          └─────────────────────────────────────┘
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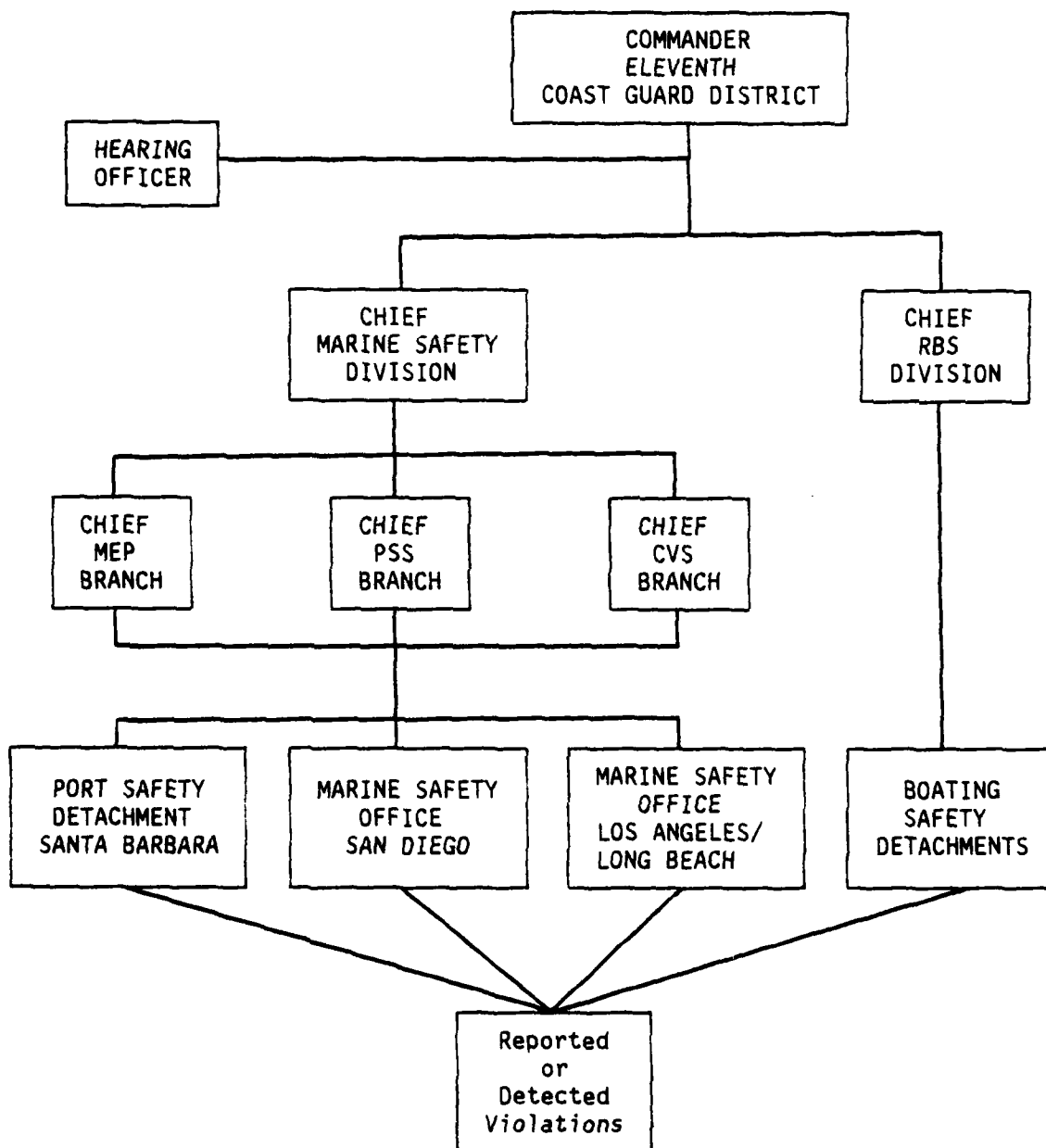
APPENDIX B

STUDY AREA MAP

NEVADA

UTAH

CALIFORNIA

ARIZONA

STUDY AREA

APPENDIX C

REGRESSION ANALYSIS RESULTS

The subfile regression results for each of the programs and dependent variables is presented below. The column head "Ind. Var." indicates the variables which were eventually included in the subfile analyses. Some of these variables do not appear in section IV.A.1.a & b. These variables are dummy variables created to include significant factors in the analysis. They will be identified where they appear. The column head "coef." indicates the variable's coefficient. The column head "Cum. R squared" indicates the cumulative R squared for that variable and all others above it in the table. The regression constant is also given at the bottom of the table. Finally, the F-statistic, degrees of freedom (DF), and probability value (PV) is listed for the regression analysis.

A. RBS-FINPEN Regressions

   Subfile: PREWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	70.44	.19617
NUMREG	3.67	.19623
E1	47.59	.26831
NAVEQP	7.35	.27583
SAFEQP	8.16	.30709
NOOOF	13.95	.31956
COMPEV	-13.66	.35235
Constant = 13.29		

   f-stat: 7.22791   DF: (7,93)   PV: .0000007

NOTE: The variable E1 is a dummy variable used to account for the significant difference of the dependent variable when ENFSRC=1, that is when the source of the violation report was an RBS unit.

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Subfile: WENDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	17.01	.00017
NUMREG	19.31	.07533
E1	-16.17	.08221
NAVEQP	17.12	.11705
SAFEQP	28.23	.49061
NOOOF	60.91	.55744
COMPEV	-21.59	.59300
Constant = -2.95		

F-stat: 27.27511   DF: (7,132)   PV: .0000000

Subfile: *PSTWNDT*

Ind. Var.	Coef.	Cum. R squared
PRIORS	-03.10	.00534
NUMREG	15.64	.02025
E1	4.87	.04142
NAVEQP	22.18	.24522
SAFEQP	21.69	.46772
NOOOF	22.54	.49454
COMPEV	-34.41	.59227
Constant = 5.93		

F-stat: 8.09297   DF: (7,39)   PV: .0000046

B.   RBS-PROPEN Regressions

Subfile: PREWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	118.94	.39374
NUMREG	5.92	.39756
E1	28.40	.40589
NAVEQP	6.31	.40971
SAVEQP	17.24	.50710
NOOOF	48.08	.58063
Constant = 11.23		

F-stat: 21.69073   DF: (6,94)   PV: .0000000

Subfile: WENDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	-09.16	.00102
NUMREG	21.57	.10107
E1	10.29	.10567
NAVEQP	16.71	.14445
SAFEQP	29.30	.55820
NOOOF	84.70	.68181
Constant = -1.76		

F-stat: 47.49760   DF: (6,133)   PV: .0000000

Subfile: PSTWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	3.17	.01874
NUMREG	19.03	.04959
E1	7.74	.09401
NAVEQP	18.17	.20619
SAFEQP	⁻ 28.41	.50380
NOOOF	88.60	.67115
Constant = 3.66		

F-stat: 13.60603   DF: (6,40)   PV: .0000000

C. MEP-FINPEN Regressions

Subfile: PREWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	51.48	.02488
QNTDIS	.249	.26545
PPRCTR	33.52	.26938
W1	-197.25	.27153
E2	17.63	.27535
E3	131.41	.28057
ES	402.57	.34988
Constant = 232.78		

F-stat: 6.68868   DF: (7,87)   PV: .0000024

Note: The variable W1 takes on the value 1 when WATERS=1 (Coastal), E2
        takes on the value 1 when ENFSRC=2 (MSO Los Angeles/Long Beach),
        E3 takes on the value 1 when ENFSRC=3 (MSO San Diego), and ES
        takes on the value 1 when ENTSZE=1 (the group of largest entities).

Subfile: WENDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	39.73	.03685
QNTDIS	.419	.43162
PPRCTR	-417.03	.43259
W1	-513.48	.43262
E2	1399.83	.45535
E3	1240.93	.47676
ES	679.31	.53719

Constant = -589.62

F-stat: 13.26548   DF: (7,80)   PV: .0000000

Subfile: PSTWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	110.96	.01151
QNTDIS	.026	.11480
PPRCTR	561.69	.15142
W1	287.57	.15286
E2	-433.18	.17421
E3	-265.45	.20420
ES	466.15	.27886

Constant = 180.24

F-stat: 3.20403   DF: (7,58)   PV: 0061443

D. MEP-PROPEN Regressions

Subfile: PREWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	412.24	.09241
QNTDIS	.244	.22137
PPRCTR	84.16	.22154
W1	-737.83	.26209
E2	291.29	.26960
E3	200.59	.27161
ES	232.62	.27995

Constant = 653.12

F-stat: 4.83210   DF: (7,87)   PV: .0001241

Subfile: WENDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	71.99	.03877
QNTDIS	.461	.41465
PPRCTR	-610.91	.41635
W1	-716.74	.41887
E2	1232.73	.43727
E3	1051.98	.44442
ES	848.34	.51020

Constant = -226.80

F-stat: 11.90470   DF: (7,80)   PV: .0000000

Subfile: PSTWNDT

Ind. Var.	Coef.	Cum. R squared
PRIORS	162.84	.01292
QNTDIS	.043	.21954
PPRCTR	797.41	.28201
W1	249.23	.28267
E2	-427.11	.30074
E3	-257.93	.32531
ES	458.51	.38733

Constant = 205.96

F-stat: 5.23828   DF: (7,58)   PV: .0001136

APPENDIX D

POLICY COMPARISONS

This appendix will be presented in two parts. First, the results of regression equation comparisons will be made. These comparisons were effected using the CHOW test. The CHOW test evaluates the difference between regression equations formulated for each Hearing Officer. These regression equations, which regress independent case file variables against the penalties of the case file, represent the penalty assessment policy of that Hearing Officer.

The second part will analyze the policies of different Hearing Officers by comparing the penalties assessed by a Hearing Officer with the penalties that would have been assessed by a different Hearing Officer based on the factors of the cases of the first Hearing Officer. This is done by using a regression equation formulated for each Hearing Officer and running it on the case file data for another Hearing Officer.

A. CHOW TEST COMPARISONS

The following table summarizes the individual regression comparisons effected using the CHOW test. Three data subfiles were created that represent the three different Hearing Officer regimes. They are PREWNDT, WENDT, and PSTWNDT. They will be noted only as PRE, WNT, AND PST in the table under the column "Com. File", which indicates the files being compared. The terms "n1" and "n2" represent the number of cases in each file and "k" the number of regressors in the regression equations. The

term "SSRp" represents the residual sum of squares when the two comparison files are combined into one for a regression analysis. The terms "SSR1" and "SSR2" represent the residual sum of squares when the comparison files undergo regression analysis separately. "F" represents the F-statistic calculated by the CHOW test and "PV" represents the probability value of the F-statistic. The probability value indicates the probability of the difference between the two regression equations being only chance. Two separate tables are presented for both RBS and MEP data. This is because separate regressions were effected using FINPEN, the final assessed penalty, and PROPEN, the proposed penalty, as the dependent variable.

RBS-PROPEN Comparisons

Com. Files	n1	n2	k	SSRp	SSR1	SSR2	F	PV
WNT & PRE	140	141	6	139,706	53,579	53,329	9.949	.0000
WNT & PST	140	47	6	72,127	53,579	17,879	.231	.9773
PRE & PST	47	101	6	92,745	17,879	53,329	5.790	.0000

RBS-FINPEN Comparisons

Com. Files	n1	n2	k	SSRp	SSR1	SSR2	F	PV
WNT & PRE	140	101	7	190,705	69,211	71,370	13.860	.0000
WNT & PST	140	47	7	97,376	69,211	25,144	.684	.7051
PRE & PST	101	47	7	119,532	71,370	25,144	6.499	.0000

MEP-PROPEN Comparisons

Com. Files	n1	n2	k	SSRp	SSR1	SSR2	F	PV
WNT & PRE	88	95	7	159,014	76,109	69,575	1.910	.0615
WNT & PST	88	66	7	154,943	76,109	23,801	9.502	.0000
PRE & PST	95	66	7	104,227	69,575	23,801	2.106	.0387

MEP-FINPEN Comparisons

Com. Files	n1	n2	k	SSRp	SSR1	SSR2	F	PV
WNT & PRE	88	95	7	85,657	50,194	22,700	3.655	.0006
WNT & PST	88	66	7	118,202	50,194	24,057	10.211	.0000
PRE & PST	95	66	7	53,578	22,700	24,507	2.6411	.0098

B. T-TEST COMPARISONS

As noted, these comparisons determine if the policy of one Hearing Officer would have resulted in different penalties given the cases of another Hearing Officer. The first step in this process is to use the regression equation developed for a Hearing Officer to compute predicted penalties based on data of a second Hearing Officer's case files. Then, a mean and standard deviation for the predicted penalties is computed. These are then compared, using a T-test, to the actual mean penalty and standard deviation of the second Hearing Officer's case files.

The first column of the following tables is labelled "SR." This indicates the source of the regression equation used for the comparison. A regression equation may be from one of the three data subfiles, either PREWNDT (PRE), WENDT (WNT), or PSTWNDT (PST). The first step in the comparison is to compute predicted penalties using the SR equation on the case file data of the reference file, labelled "RF." A mean penalty, "X1," and standard deviation, "S1," using the SR equation is then compared, using a T-test, to the actual mean penalty, "X2," and standard deviation, "S2," assessed in the reference file. A test statistic, "TS," and probability value, "PV" associated with each comparison is then indicated. Finally, X1 is adjusted to the time frame of the reference

file, using a 15% inflation factor, and is labelled "X1'." X1' is then compared to X2 using the T-test and a second test statistic, "TS'," and probability value, "PV'," are computed. The basic hypothesis is that the population mean difference is not statistically significant. Where the PV or PV' is less than the alpha level of .01, a conclusion may be drawn about the difference in the two populations. A summary of the conclusions follows each table. As before, the comparisons were run for each program, once using PROPEN and once using FINPEN.

RBS-FINPEN Comparisons

SR	RF	X1	X2	S1	S2	TS	PV	X1'	TS'	PV'
PRE	WNT	28.03	45.34	12.84	34.97	-5.50	.000	32.23	-4.16	.000
PRE	PST	31.62	42.96	19.04	36.62	-1.88	.031	41.82	-0.19	.425
WNT	PRE	43.06	27.07	30.79	33.20	3.55	.000	37.44	2.30	.010
WNT	PST	41.74	42.96	29.02	36.62	-0.18	.429	48.00	0.74	.231
PST	PRE	38.26	27.07	27.24	33.20	2.62	.005	28.93	0.44	.332
PST	WNT	45.01	45.34	23.29	34.97	-0.09	.463	39.14	-1.75	.041

Conclusions

SR	RF	Hypotheses Accepted
PRE	WNT	X2 > X1, X2 > X1'
WNT	PRE	X1 > X2, X1'> X2
PST	PRE	X1 > X2

RBS-PROPEN Comparisons

SR	RF	X1	X2	S1	S2	TS	PV	X1'	TS'	PV'
PRE	ENT	38.25	53.08	18.82	34.81	-4.43	.000	43.99	-2.72	.003
PRE	PST	41.09	56.57	23.09	34.38	-2.56	.006	54.34	-0.37	.356
WNT	PRE	54.54	42.33	30.46	35.52	2.63	.005	47.43	1.10	.137
WNT	PST	52.65	56.57	28.85	34.38	-0.60	.275	60.55	0.61	.272
PST	PRE	57.98	42.33	30.15	35.32	3.39	.000	43.84	0.33	.372
PST	WNT	56.17	53.08	27.98	34.81	0.82	.207	48.84	-1.12	.131

Conclusions

SR	RF	Hypotheses Accepted
PRE	WNT	X2 > X1, X2 > X1'
PRE	PST	X2 > X1
WNT	PRE	X1 > X2
PST	PRE	X1 > X2

MEP-FINPEN Comparisons

SR	RF	X1	X2	S1	S2	TS	PV	X1'	TS'	PV'
PRE	WNT	535	946	531	1116	-3.12	.001	616	-2.51	.007
PRE	PST	602	536	1877	716	0.27	.395	796	1.05	.147
WNT	PRE	880	454	731	609	4.36	.000	765	3.19	.001
WNT	PST	881	536	3198	716	0.85	.197	1013	1.18	.120
PST	PRE	431	454	281	609	-0.34	.633	326	-1.86	.032
PST	WNT	470	946	271	1116	-3.89	.000	409	-4.39	.000

Conclusions

SR	RF	Hypothesis Accepted
PRE	WNT	X2 > X1, X2 > X1'
WNT	PRE	X1 > X2, X1'> X2
PST	WNT	X2 > X1, X2 > X1'

MEP-PROPEN Comparisons

SR	RF	X1	X2	S1	S2	TS	PV	X1'	TS'	PV'
PRE	ENT	690	1120	619	1336	-2.74	.003	793	-2.08	.009
PRE	PST	763	582	1818	773	0.74	.228	1009	1.76	.041
WNT	PRE	1038	675	826	1013	2.70	.004	902	1.69	.047
WNT	PST	1075	582	3505	773	1.12	.113	1236	1.48	.071
PST	PRE	461	675	308	1014	-1.98	.025	348	-3.01	.001
PST	WNT	492	1120	299	1336	-4.31	.000	428	-4.75	.000

Conclusions

SR	RF	Hypotheses Accepted
PRE	WNT	X2 > X1, X2 > X1'
WNT	PRE	X1 > X2
PST	PRE	X2 > X1'
PST	WNT	X2 > X1, X2 > X1'

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APPENDIX E

RECREATIONAL BOATING SAFETY DATA

A. NUMBER OF BOATS REGISTERED BY STATE

The following information about boat registrations was provided by the person and agency noted for each state. All data were obtained by telephone conversations on 29 October, 1981.

1. California

Year	Boat Registrations
1978	551,298
1979	565,057
1980	556,001
1981	533,732

Source: Priscilla Williams, Department of Motor Vehicles

2. Arizona

Year	Boat Registrations
1978	85,811
1979	91,510
1980	95,839
1981	100,377

Source: James Benton, Department of Fish and Game

3. Nevada

Year	Boat Registrations
1978	24,339
1979	26,754
1980	27,470
1981	Unavailable

Source: Jan Kiesling, Department of Fish and Game, Licensing Division

4. Utah

Year	Boat Registrations
1978	41,615
1979	43,556
1980	44,323
1981	Unavailable

Source: Milly Tenney, Department of Parks and Recreation

B. BOAT INSPECTIONS AND VIOLATION DETECTION

The following data are presented by calendar year quarter except for a three quarter period extending from the first quarter of 1980 up to and including the third quarter of 1980. During this period, data were available only as summarized for the entire three quarters. The column headed "Total Insp." is the number of inspections made during the period for violations of RBS statutes and regulations. "Viol. Insp." indicates the number of inspections where violations were detected. "Total Viol." indicates the total number of individual violations detected.

Year/Quarter	Total Insp.	Viol. Insp.	Total Viol.
1978/1	337	146	239
2	1010	438	880
3	1695	816	1426
4	409	169	273
1979/1	382	208	343
2	1181	675	1199
3	1407	833	1485
4	444	253	441
1980/1 Through 1980/3	1829	965	1594
1980/4	446	206	311
1981/1	336	159	351
2	721	410	762
3	903	503	921

Source: Boating Safety Division, Commander Eleventh Coast Guard District

APPENDIX F

MARINE ENVIRONMENTAL PROTECTION DATA

The following data were taken from the PSS/MEP Quarterly Activities
Reports of the Eleventh Coast Guard District. Data are listed for indi-
vidual law enforcement units as well as an aggregate figure for the
entire District. "SB" stands for the Port Safety Detachment, Santa
Barbara, California. "LA" stands for the Marine Safety Office, Los
Angeles/Long Beach, California. "SD" stands for the Marine Safety Office,
San Diego, California. The column head "Disch." lists the number of
prohibited oil discharges reported to or detected by the Coast Guard that
quarter, that occurred in the Eleventh Coast Guard District. The head
"Viol. Rpt." represents the number of actual violation reports submitted
and processed for these discharges. "Oil Trans." represents the amount
of oil (in barrels x 1,000) that was transferred. "Oil Spl." represents
the amount of oil (in barrels) discharged into U.S. waters in violation
of the Clean Water Act.

Year/Qrt.	Unit	Disch.	Viol. Rpt.	Oil Trans.	Oil Spl.
1978/1	SD	56	10	3,409	26
	LA	214	27	88,629	2735
	SB	48	3	4,216	714
	Tot.	318	40	96,254	3475
1978/2	SD	47	7	9,800	482
	LA	194	34	109,591	4572
	SB	34	1	6,378	70
	Tot.	275	42	125,769	5174

Year/Qrt.	Unit	Disch.	Viol. Rpt.	Oil Trans.	Oil Spl.
1978/3	SD	50	13	4,250	40
	LA	192	28	91,960	147
	SB	9	0	4,517	121
	Tot.	251	41	100,727	308
1978/4	SD	25	10	2,637	264
	LA	131	33	62,962	125
	SB	7	0	5,860	10
	Tot.	163	43	71,459	399
1979/1	SD	21	8	5,951	20
	LA	106	27	68,003	275
	SB	20	0	4,497	59
	Tot.	207	35	78,451	354
1979/2	SD	32	10	4,951	42
	LA	156	26	65,927	200
	SB	15	2	3,865	30
	Tot.	203	38	74,743	272
1979/3	SD	76	14	2,873	49
	LA	128	34	45,938	38
	SB	30	1	4,166	31
	Tot.	234	49	52,977	118
1979/4	SD	43	8	7,962	75
	LA	103	26	125,045	244
	SB	20	5	3,806	57
	Tot.	166	39	136,813	376
1980/1	SD	36	6	3,681	78
	LA	92	33	93,893	162
	SB	15	7	4,408	9
	Tot.	143	46	101,982	249
1980/2	SD	24	8	3,693	431
	LA	70	17	94,975	292
	SB	15	6	5,025	35
	Tot.	109	31	103,693	758
1980/3	SD	44	10	4,601	318
	LA	102	30	94,998	200
	SB	22	8	5,002	35
	Tot.	168	48	104,601	553
1980/4	SD	28	5	3,150	24
	LA	125	29	95,974	2374
	SB	12	5	4,026	16
	Tot.	165	39	103,150	2414

Year/Qrt.	Unit	Disch.	Viol. Rpt.	Oil Trans.	Oil Spl.
1981/1	SD	38	13	3,507	66
	LA	107	41	95,601	87
	SB	10	3	3,099	43
	Tot.	155	57	102,207	196
1981/2	SD	51	13	3,074	30
	LA	161	45	46,739	262
	SB	7	1	4,742	1
	Tot.	219	59	54,555	293
1981/3	SD	60	31	2,195	164
	LA	200	27	100,404	336
	SB	15	5	6,000	14
	Tot.	275	63	108,599	514

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